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## List of Lectures before Easter, 1892.

FRIDAY, March 4th. Lieutenant F. J. DAVIES, *p.s.c.*, Grenadier Guards, on "The employment of Photography in Reconnaissance."

FRIDAY, March 11th. W. B. TEGETMEIER, Esq., on "Pigeons for Land and Sea Service, with examples from recent Experiments."

FRIDAY, March 18th. ROBERT H. SCOTT, Esq., M.A., F.R.S. (Meteorological Office), on "Atlantic Weather and its connection with British Weather."

FRIDAY, March 25th. Colonel T. B. SHAW-HELLIER (Commandant, Royal Military School of Music, Kneller Hall), on "The Organization of Military Bands, and on Military Music." The lecture will be given in the Banqueting House, Whitehall, and will be illustrated by the Kneller Hall Band.

THURSDAY, March 31st. Lieut.-Colonel N. L. WALFORD, h.p., R.A., on "Field Howitzers and Mortars."

FRIDAY, April 8th. Captain Sir ALFRED JEPHSON, R.N. (Hon. Secretary, R.N. Exhibition), on "The Royal Naval Exhibition of 1891."

Major L. EDIE, R.M.L.I. (Hon. Secretary, Arts Section, R.N. Exhibition), on "The Arts Section of the Naval Exhibition."

It is hoped that Colonel Gouraud will give his lecture on "The Phonograph" on an early day after Easter.

EXTRA LECTURES AND CHANGES IN THE DATES OF LECTURES ARE  
ADVERTISED IN THE LEADING MORNING AND EVENING DAILY PAPERS AND IN THE  
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**The Journal**  
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**[Monthly Issue.]**

**Friday, January 29, 1892.**

**ADMIRAL SIR R. VESEY HAMILTON, K.C.B., President, Royal Naval College, Greenwich, in the Chair.**

**AN ATTEMPT TO ESTIMATE THE PROBABLE INFLUENCE  
OF THE INTRODUCTION OF Q.F. GUNS ON NAVAL  
TACTICS AND CONSTRUCTION.**

**By Rear-Admiral S. LONG.**

THE subject which, by the wish of the Council of this Institution, I am to bring before you to-day is one of great importance to all navies, and especially to our own. The enterprise and skill of Lord Armstrong and Co., emulated by numerous other firms on the Continent, have resulted in the production on a large scale of powerful guns with a rapidity of fire at least five-fold as great as that obtainable from guns of such calibre only five years ago.

The 4.7-inch and 6-inch Q.F. guns, to which I allude more especially, are probably familiar to all who had the opportunity of visiting the magnificent Armstrong gallery of the Royal Naval Exhibition of 1891, but a comparative table is exhibited for convenience. Guns of this type will now form an important feature in the armament of even the heaviest battle-ship, while they will constitute probably the main armament of most cruisers.

Such a marked increase in the rapidity of fire is likely, in the opinion of many Officers, to have more influence on sea fights than the increased power of the guns which has been so marked a feature in all navies since the Crimean War, and which was described by Captain A. Noble, C.B., F.R.S., in his address to the British Association at Leeds in 1890, which may be found in "Engineering" of September 12 and 19, 1890, from which I quote the following:—

"A trial has also been recently made between two cruisers, the one armed with ordinary breech-loading, the other with quick-firing, artillery, from which it appears that, when firing at a target, the

latter in a given time was able to discharge about six times the quantity of ammunition fired by the former.

"I need not impress upon you the significance of these facts, or the importance of quick-firing armaments, especially if firing shell, possibly charged with high explosives, against the unarmoured portions of cruisers or other vessels."

Naval Officers will readily acknowledge the truth of this statement when the large area of unarmoured structure to be found even in armour-clad vessels is considered.

While on the subject of Elswick, I will quote a very interesting statement contained in the work "Modern Naval Artillery," published as a guide to the Armstrong exhibit at the Royal Naval Exhibition, showing the advantages of Q.F. guns against torpedo-boats:—

"One of the principal reasons which has led to so large an employment of Q.F. guns in the naval services is, no doubt, the necessity of being able to cope instantly and effectually with the attack of torpedo-boats. The very high speed possessed by the modern torpedo-boat, while increasing its powers of offence, has, at the same time, diminished the risk of its being hit. It not only remains a much shorter time exposed to fire when making its attack, but its rapid motion necessitates a great alteration of aim between each round fired at it, and a corresponding likelihood of error. Suppose a torpedo-boat to be sighted at a distance of 1,700 yards by a war-vessel having a broadside armament of three Service 5-inch B.L. guns, each capable of firing two rounds a minute; the torpedo-boat could not hope to discharge a torpedo with much certainty at a longer range than 400 yards, and would therefore have to traverse a distance of 1,300 yards under fire before she could begin the attack. Assuming the speed of the first class torpedo-boat to be 20 knots an hour, the time occupied in traversing 1,300 yards would be, roughly speaking, two minutes. The war-vessel, therefore, armed with a broadside of three 5-inch guns, each firing two rounds per minute, would be able to discharge twelve shots at the torpedo-boat before there was a chance of her being torpedoed. If, however, in lieu of the three Service 5-inch guns, she were armed with three of the improved Armstrong 4.7-inch 45-prs., she could in the same time fire no less than seventy-two shots, each gun being capable of firing twelve shots a minute. Besides the obvious advantage of being able to fire six times as often, and have six times as good a chance of hitting, there is the collateral one of a very slight alteration of aim being required in the one case, and a very considerable one in the other. Between each round of the 5-inch breech-loading gun the torpedo-boat would move 340 yards, and the aim would have to be correspondingly altered, while between the rounds of the Q.F. 45-pr. gun she would only move 50 yards, and a very slight alteration would be required, and a successful shot would be instantly repeated." "Rapidity of fire must under most circumstances be considered as a very important element in war, but it is recognized by most artillerists that a rate of about ten rounds a minute is sufficient for all guns larger than the 6-pr.

Any quicker rate is liable to be obtained at the cost of impaired efficiency in other directions, and carelessness on the part of the crew in loading and aiming will probably be developed." "Smaller Q.F. guns than the 4.7-inch have been introduced recently, firing shots of 25, 20, 12, and 10 lbs. respectively, and the 25-pr. with a calibre of 3.75 inches is specially suited for the armament of torpedo-boat catchers. A good many of these guns have been made, and they possess a muzzle velocity of 2,200 feet with ordinary powder, and can fire from twelve to fifteen rounds per minute." "It is found that three times the weight of the cordite charge is necessary when powder is used."

It may be remarked that rapidity of fire is more important at sea, where moving bodies are concerned, than on land, the power to repeat a shot instantly before the vessels have much changed their position being likely to produce much more effective firing.

From the same volume the record of Series D of the Silloth experiments with the 6-inch Q.F. gun, which took place on October 8, 1890, is extracted. It is remarked that smoke of a reddish-brown colour was given off by the cordite, but this was so transparent that it would never have interfered with laying the gun; moreover, it rapidly disappeared in spite of the absence of wind.

*Series D.*—Five rounds with 15 lbs. cordite, and common shell, weight 100 lbs., for rapidity at 900 yards target.

One trial round was fired to obtain elevation, and the firing was then carried on, with the following results, the total time being only fifty-five seconds:—The first four rounds hit the target, the fifth being 5 yards short; the casks supporting the target flag were entirely destroyed and the flag perforated.

The opinion expressed by Major G. S. Clarke, R.E., in his work on "Fortification," is interesting. After stating that armour was originally introduced as a protection against shell, and reviewing the various types of vessels found in our own and foreign navies, with respect to their powers of attack against guns posted on shore, he remarks:—

"To attempt to pierce the armour of the 'Dandolo' and 'Duilio,' or of our 'Inflexible' class, would be a pure waste of ammunition, considering that any of these vessels might be put out of action in half an hour by well-handled medium guns."

The present Director of Naval Construction, Mr. W. H. White, C.B., F.R.S., has also expressed the opinion at the Institute of Naval Architects that it is possible an action between armoured ships might be decided without the armour being pierced, and more to the same effect will be found in "Modern Naval Artillery."

There is no finality in invention, but naval Officers are bound to endeavour to forecast correctly the effect on tactics of each change in naval weapons, of which the present generation have seen so many.

It appears certain that the increased rapidity of fire will render tactics afloat more important, for the subjection of an inferior force to the fire of a superior one, even for a short period, will have at least five-fold significance.

In looking back for guidance as to the changes of opinion on naval tactics which have taken place during the last twenty years, I must acknowledge my indebtedness to the numerous members of this Institution who have written and spoken on this subject, as well as to those Officers who have published books and pamphlets upon it. In these studies we can only follow up trains of thought suggested by others, and no claim is here made for originality.

On comparing the views set forth in 1880 with those indicated in 1886, we are at once struck with the influence the torpedo has exercised in modifying the conception of a sea fight therein exhibited. At the former period the ram held a paramount place as the arm whose effective use constituted the tactical object even during the first phase of an engagement.

At the latter date the torpedo is admitted to be some counterpoise to the ram, and the possibility of an artillery duel constituting the first phase of an engagement between fleets is contemplated.

The progress of gunnery and torpedo equipment during the last five years has certainly strengthened the arguments in favour of the latter view, and the anticipated introduction of smokeless powder will greatly lessen, if not altogether remove, the impediments to manœuvring resulting from the smoke of guns. It, therefore, appears probable that we may look for a more unrestrained use of artillery in future naval actions, and that the intimate connection, to use the words of the late General Sir Howard Douglas, between the Service practice of gunnery and naval tactics will be universally acknowledged.

When the powerful gun armament, and the large amount of displacement devoted to armoured protection in modern battle-ships is considered, as well as the fact that the displacement devoted to armour is of no avail against the explosion of a torpedo, it would appear that full advantage should be taken of these features in her equipment before staking everything on the hazard of a torpedo at close range.

While, therefore, the ram, which at one time appeared undisputed arbiter of naval tactics, from the first appearance of impending battle, continues to hold its place as perhaps the most important weapon, seeing that it utilizes a larger portion of the displacement than any other, and retains its efficiency, so long as the ship floats with motive and directive power intact, it does not appear probable that the efforts of antagonists will, during the first phase of a naval engagement, be devoted to its use, though doubtless it will become an important factor in the ultimate decision of the contest.

On this point Vice-Admiral Bourgois, of the French Navy, writing some thirteen years ago, said: "The return to the ancient methods of fighting with artillery from a distance and on the broadside can only be conceived in the case of two hostile squadrons equally disinclined to risk being struck by the torpedoes of their respective adversaries.

"But the more and more pronounced superiority of artillery over armour plates, in close actions, the only ones of a decisive character, would expose the fighting ships to serious dangers, almost as formid-





FIG. 1.

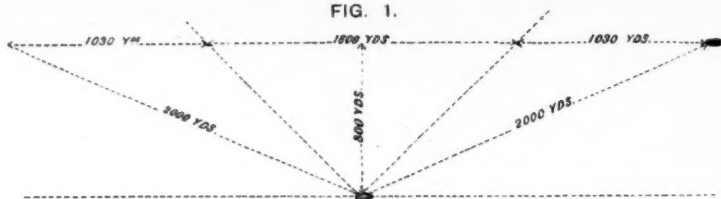


FIG. 3.  
POSITION OF SUPPORT.

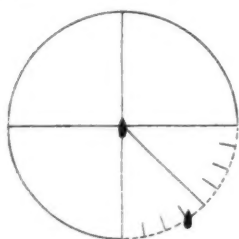


FIG. 2. TWO PIEMONTE.  
SPEED 20.5 KNOTS.

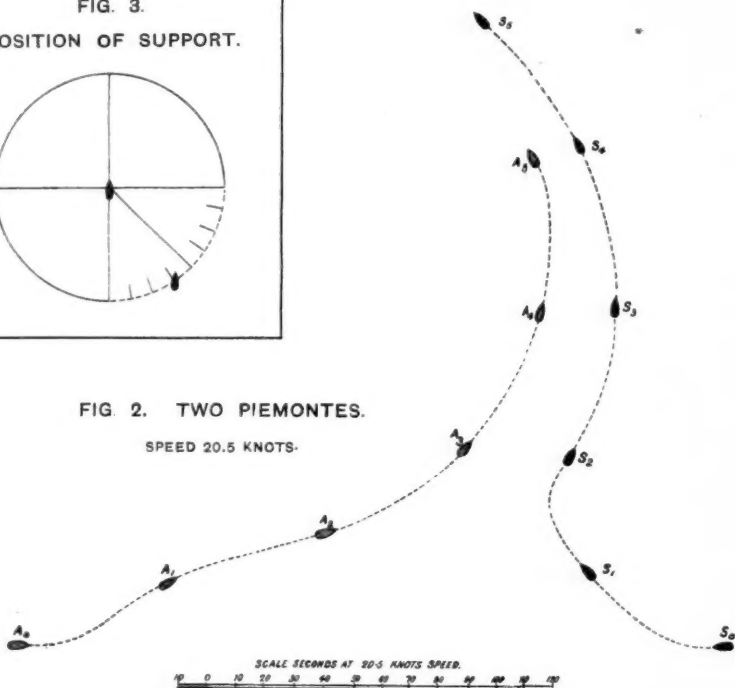
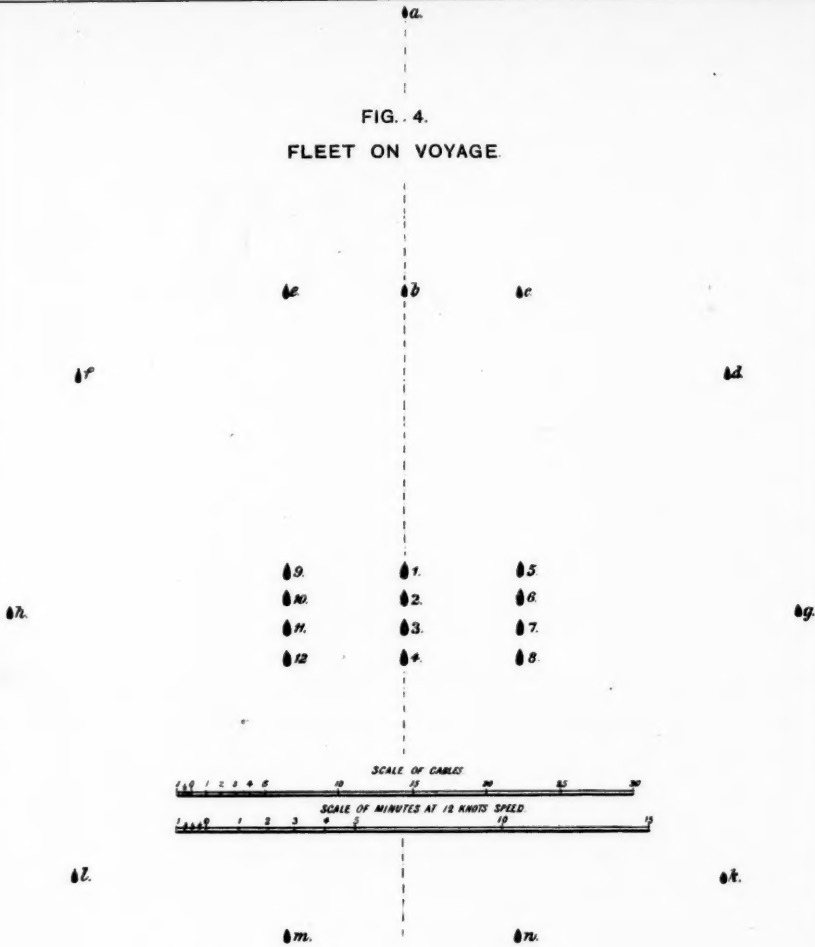


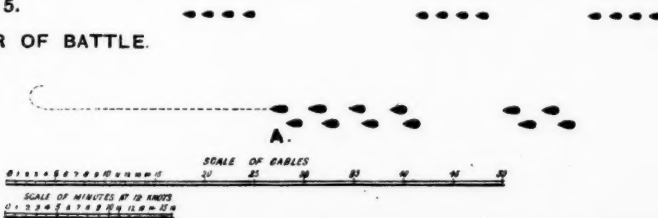
FIG. 5  
FLEET IN ORDER



FIG. 4.  
FLEET ON VOYAGE.



G. 5.  
ORDER OF BATTLE.





able as those presented by torpedoes, if they should not present their plated sides obliquely to the impact of projectiles.

"Against this oblique fire the armoured side still offers a protection it would be rash to disdain. The skill of the manœuvrer, when the ram blow shall be denied to him by torpedoes, should be directed to avoid presenting his broadside to the direct or normal impact of his adversary's projectiles, while at the same delivering his own with direct impact on the enemy's side.

"This double object is too different from that formerly held in view by wooden steam vessels to permit of any reversion to the manœuvres suited to squadrons of such vessels."

Admiral Bourgois's prescience will probably be acknowledged, and I shall assume in what follows that an artillery duel will form the first phase of a naval engagement, the object being to engage beyond effective torpedo range, until the enemy's battery is much reduced in power, and his exposed torpedo discharges rendered useless.

It is necessary then to assume some distance as a limit to the effective range of the gun and torpedo, as well as to define approximately the limit within which the approach of a ram must influence movements. In view of the serious effect of high-angle fire-practice against decks, distant shots may under special circumstances be resorted to, but the decisive events of an action will probably take place at ranges under 2,000 yards, at which distance the remaining velocities of the 6-inch and 4.7-inch projectiles are about 1,630 f.s. and 1,440 f.s. respectively.

While recognizing the great influence the state of the sea would exert in any particular case, and the advantage conferred upon the combatant possessing the larger and steadier vessels, I shall in the present paper consider gun-fire efficient at sea up to 2,000 and torpedo-fire up to 600 yards.

As regards the ram, if we assume that one ship will in most cases be able to turn herself parallel with another in two minutes, and that two minutes turned into space traversed at 16 knots speed per hour is 1,080 yards, we see that the ram may become an influential factor in a ship's movements when vessels are yet beyond what has been described as effective torpedo range.

The other feature governing the use of artillery is the effect of the projectiles on impact. From this point of view the presentation of the armoured broadside parallel to that of an enemy abeam is to be avoided, as his shot or shell striking normally would have a maximum penetration.

The large arcs of fire now given to broadside guns will frequently enable an enemy suitably placed to be struck normally to his armour, while the vessel firing occupies an oblique position.

It may be assumed that projectiles of ordinary form whose path makes a less angle with the surface of an armour plate than  $45^{\circ}$  will not penetrate.

Thus an enemy occupying a position in the sectors extending four points each side of a vessel's bow and stern would be unable to penetrate her side if armoured along the broadside portion.

In a battle between armour-plated ships of the same date of construction, it would on this ground be useless to discharge the heavy armour-piercing guns until the target aimed at presented a suitable angle.

If a vessel armoured sufficiently to keep out shell were engaged with another destitute of such defence, the latter would be at a great disadvantage, as while one would be vulnerable from all points of the compass the other would have, with respect to her armoured parts only, an arc of impunity of no less than 16 points.

It will be observed (Diagram 1) that if two vessels on opposite courses are so situated as to pass each other abeam at a distance of 800 yards, they would be within 2,000 yards of each other for more than 1,000 yards distance before presenting a direct target to each other. In many cases of actions between single ships and of ships engaging forts, there would probably be an advantage open to one opponent by maintaining the position as much as possible in which he presented an oblique target to his enemy, and this especially at the beginning of an action, when all guns are intact and fire a maximum.

In a single-ship action superior speed would be an important factor in enabling its possessor to select his own position, but in elaborating any system of tactics based on speed, it must not be forgotten that in any but the smoothest waters speed means spray, which on the weather side may very easily amount to a serious impediment to effective gun-practice, and it may be predicted that the weather gauge if two ships were steering the same course at a high speed would constitute an important advantage, as the lee guns could be fought with much greater rapidity and precision than the weather ones.

Such illustrations of practical naval warfare as are afforded by the history of the last thirty years were brought before us last year by Mr. Laird Clowes, so that nothing is to be gained by repeating them; but, while concurring in most of his deductions, I think he has underestimated the importance of the ram.

Possibly the fact that the "Shah" was not fitted for ramming may have escaped his notice; had she been so, it is scarcely likely that with her superior speed the "Huascar" could have escaped either her ram or a torpedo fired at close quarters.

The naval warfare consequent on the late civil war in Chili has afforded an example of the power of the torpedo in the sinking of the "Blanco Encalada," on April 23rd, 1891, in Caldera Bay. In this case the "Almirante Lynch" and "Almirante Condell" were torpedo gunboats of the latest type, built in 1890, by Messrs. Laird, of Birkenhead, while the "Blanco Encalada" was built in 1875, and presumably not subdivided into as numerous compartments as vessels of more recent construction, though her scantlings are probably quite as heavy.

The utter abandonment of all precaution on the side of the "Blanco Encalada" appears to deprive the incident of much interest from a tactical point of view.

Assuming, therefore, that single-ship actions between cruisers of

current types would generally be fought on the principle indicated in this paper, it appears only necessary to examine the case where one combatant, whom we may call "Aries," either specially constructed for right-ahead attack, or conscious of markedly inferior gun armament, should determine to keep his opponent right ahead continuously.

If the other, who may be called "Sagittarius," decide to keep "Aries" as far abaft the beam as is consistent with his guns bearing, and has arcs of training to his broadside guns extending to  $60^\circ$  before and abaft the beam, he will subject "Aries" to a superiority of fire, for a period whose duration will depend upon the relative speeds of the ships. Moreover, when "Aries" approaches within torpedo range, he will offer a favourable mark for the torpedo of "Sagittarius," unless he has succeeded in destroying the latter's torpedo equipment. On the other hand, should "Sagittarius" suffer damage to motive or steering power, he will incur great risk of being rammed, though, if his torpedo gear is intact, he will be able to torpedo his approaching adversary.

In order to estimate the probable extent of the superiority of fire alluded to, the case of two "Piemonte's" is taken, supposed to be steaming at equal speeds of 20.5 knots, being the maximum natural draught speed credited to the vessel. "Piemonte's" armament, as stated by Mr. Watts, in his paper read at the Institute of Naval Architects, April 11th, 1889, is four 6-inch guns, three  $4\frac{3}{4}$ -inch guns, five 6-pr. Hotchkiss guns, five 1-pr. ditto, and four 10-mm. Maxim guns, can be fired on either broadside, while three 6-inch, four 6-pr. Hotchkiss guns, two 1-pr. Hotchkiss guns, and two 10-mm. Maxim guns can be fired either right ahead or right astern.

The diagram (2) shows the vessels during a period of five minutes, and at distances apart varying from 2,400 to 590 yards.

Should they be credited with continuous firing from right-ahead and broadside armaments respectively, the case will stand as follows:—"Aries," firing right ahead, will have expended 75 6-inch shell, 500 6-pr., 300 1-pr., and 7,000 Maxim bullets; while "Sagittarius," from his broadside, will have expended 100 6-inch shells, 105 4.7-inch shells, 625 6-pr., 750 1-pr., and 1,400 Maxim bullets. Thus "Sagittarius" may claim a superiority of 25 6-inch shell, 105 4.7-inch shell, 125 6-pr., 450 1-pr., and 7,000 Maxim bullets.<sup>1</sup>

As regards impact, the guns of "Sagittarius" would be more enfiladed by the fire of "Aries" than the latter's by the fire of his opponent. The crews of disengaged guns on both sides would probably be kept as much as possible under cover from small projectiles and Maxim bullets.

The guns of "Aries," on the other hand, bearing on his adversary, and exposed to such a torrent of projectiles, could scarcely fail to be disabled, which might induce him to alter his tactics.

According to the table given in Admiral Colomb's War Game, the shots of "Sagittarius" would be of more value, shot for shot, than

<sup>1</sup> Mr. T. Van Roosevelt, in his "History of the Naval War of 1812," states that in the action between the "Shannon" and "Chesapeake" only fifty-six round shot struck the "Chesapeake," which was carried by boarding.

those of "Aries." It appears probable that such a superiority of fire would be too great to be voluntarily encountered, except under very exceptional circumstances, so that the attempt to approach end-on appears disadvantageous, and there appears no other alternative to gun tactics, at least in the first phase of an engagement.

It may be remarked that a similar study, made some eleven years ago, before the installation of machine and Q.F. guns, showed a superiority of fire in ships of similar size of only twenty-four to eight, and this example may serve to show what a torrent of projectiles will be fired from a vessel while her weapons are undamaged.

Turning now to the case of ships acting in concert, Captain Noel pointed out some years ago the necessity for defining the meaning of support. Directly two or more ships act in company, the necessity for organized movements becomes evident, and it may be remarked that in the action off Angamos, between the Chilean ships "Almirante Cochrane" and "Blanco Encalada" and the Peruvian "Huascar," the absence of concert appears to have very nearly led to disaster, as we are told that a shot from the "Cochrane" struck the "Blanco Encalada," and that the consorts nearly rammed each other.

Thus it seems evident that when two or more ships are in company, action on a preconceived plan will be essential, both for their own safety and to unite their forces successfully against an enemy.

Should a battle between fleets become, as is sometimes said, a *mêlée*, in which every ship acted independently, it seems probable that many cases of involuntary damage to friends would occur, but it is difficult to contemplate such a scene of confusion as the result to disciplined forces of the effect of battle, unless the destruction of all leaders had reduced a fleet to a mere mob of ships, so that while doubtless damaged communications would introduce occasional disorder, the fleet of any great nation would preserve its cohesion more or less, until reduced by the fortune of war to such a disadvantage as to be compelled to fly, or able to compel the surrender of its opponents.

By support, then, I understand the maintenance of such a position relatively to the other vessel or vessels in company that the fire of the ships could be united efficiently against an enemy.

Further, that the position of the vessels be such that an enemy attempting to ram one would himself incur serious risk of being rammed by the other.

The distance apart at which ships of a squadron are to keep station affects the question of artillery support. Two cables appears to be accepted generally as most suitable, and considering the result of damage to communications or steering gear in action, no less distance is likely to be accepted on the open sea.

This being so, it follows that the number of ships which can unite their fire efficiently against an enemy approaching from ahead is limited, and may probably be estimated as not more than four ships in single line ahead, such a line extending over a length of 1,000 yards.

The formation in line ahead is that ordinarily used for navigation,



especially in circumstances of difficulty, and when it is considered that the maintenance of any other formation involves the use of the compass, which is likely to be shot away in action, it seems probable that its advantages as regards facility of maintenance will outweigh any disadvantages it may have from other points of view.

When two ships are in line ahead the arcs of fire interfered with by each other's hulls are a minimum. It is true that the right-ahead fire of a squadron is reduced to that of one ship, but the assumption of a very slight échelon or quarter line will set free the bow fire, if required, and this on either side of the leader.

The more the échelon approaches to a line abreast, the nearer will the vessels composing it approach equi-distance to an enemy approaching from ahead.

A distance of one cable, or 200 yards, on either side of the wake of a ship would suffice to enable a following ship turning across it to assume an efficient ramming angle at the point of intersection. If two ships are 2 cables apart, the bearing of five points abaft the beam of leader would cause the follower to assume such a position. (Diagram 3.)

The speed at which a fleet would engage must depend on the condition of the ships composing it. Admiral Bourgois tells us that in one squadron employed during the Franco-Prussian war a speed of 8 knots was laid down in orders.

In the present discussion I shall assume 12 knots as the speed maintained. It allows a margin for increase with all recent ships, and a considerable margin of superiority to the high-speed cruisers accompanying a modern fleet, which is essential. It has one subordinate advantage for purposes of discussion, that the interval between ships of 2 cables is, at that speed, passed over almost exactly in one minute, so that, if four battle-ships are proceeding in line ahead at 12 knots, the sternmost one will in three and a-half minutes occupy the place of the leader.

Admiral Bourgois pointed out that superiority of numbers is nowhere so important as in the ramming attack; two ships well handled must succeed in ramming any single opponent bold enough to encounter them, and, in view of this, an organization of the fleet in pairs, as ordered in one of the fighting memoranda mentioned by Admiral Bourgois and approved by Vice-Admiral Sir Ed. Fremantle, K.C.B., in his paper read here in 1886, seems to possess great advantages, not the least of which is the power it gives to Officers detached in pairs to handle their ships in concert, and satisfy themselves as to the best means of utilizing their powers. In this connection, Captain, now Admiral, R. D. King's, R.N., "Remarks on Naval Battle Training," published in 1883, merits notice.

It now appears improbable that a fleet on the open sea will be accompanied by torpedo-boats, though if it has to fight in the vicinity of their headquarters they may be expected to intervene.<sup>1</sup>

<sup>1</sup> It would be the province of the strategist controlling events to screen his fleet from any unexpected attack by such vessels.

On the other hand, every fleet will be accompanied by cruisers, of which one for each battle-ship would be a minimum.

If, then, we suppose a fleet to consist of twelve battle-ships accompanied by twelve cruisers, the cruisers would require a separate organization to enable them to move in company when not dispersed on scouting duties.

I shall confine myself to pointing out probable positions for these cruisers and the fleet.

1st, when navigating on a voyage.

2nd, when advancing to attack a willing foe of equal numbers.

Diagram 4 shows a fleet steaming in three columns, which may be called the van, centre, and rear squadrons respectively. Their cruisers, which are likewise organized in three separate squadrons, attached respectively to the squadrons of battle-ships, are shown extended in scouting order. The distance to which scouts would be spread would depend on the state of the weather. At night the fleet might probably assume the formation shown in Diagram 5, the cruisers remaining extended but drawn in nearer the fleet.

Diagram 5 shows the fleet in order of battle, the rear squadron being posted a mile astern, to act as a reserve.

An enemy's fleet, supposed to have assumed a similar formation, is shown advancing, the distance apart of leaders being 6 miles, or fifteen minutes at combined speed of 24 knots.

The cruisers on both sides, which may be supposed to have extended across the front of each fleet to obscure its formation and movements, are shown, formed in squadrons a mile to the right of their respective fleets.

The great desideratum in naval tactics, that of doubling on your enemy, as was done in such a brilliant manner by Lord Nelson at the Battle of the Nile, would appear very difficult to achieve simultaneously when fleets are in motion on the open sea, while, on the other hand, Vice-Admiral Sir Edmund Fremantle pointed out here, in 1886, how it might be done successively in the case of a fleet on a wide front attacking one on a narrow front.

The line I have shown, if opposed to eight ships in line abreast, would receive the fire of their right-ahead guns, or eight against two, while passing over the 2,000 yards, which, if both are going 12 knots,<sup>1</sup> would occupy 2 minutes 28 seconds, and if fleet A concentrated his fire on the leader of B he would suffer severely.

The plan of battle on both sides will no doubt have been matured beforehand, and I shall only offer the following remarks:—

If the range at which fire becomes effective be taken at 2,000 yards, which is passed over by vessels nearing each other at a combined speed of 24 knots in little over two minutes, there would not be time, after approaching to that distance apart, for either side to assume a different formation before being intersected by the other fleet, should its leader elect to continue his course.

Is it then possible for one leader electing to begin the engagement

<sup>1</sup> Knot at Greenwich 6082·5 feet.

with an artillery duel beyond torpedo range, to prescribe the manœuvre by initiating a movement involving a corresponding action on the opponent's part?

If both fleets continue their course there would be no advantage to either side, but the leaders encountering the fire of a line in succession would probably be crippled or reduced to a sinking condition.

If both fleets turned sixteen points in succession, leaders first, they would each deliver their fire against their opposite numbers, and no advantage to either side is apparent.

If fleet A turns four points to the right in succession, and fleet B does the same, they would exchange their fires on an equality.

If fleet A turns four points to the right while fleet B keeps straight on, B's van would pass through between the van and centre of A, receiving the fire of A's van and torpedoes from the Nos. 3 and 4 of A's van, while, if they attempted to ram any ship of A's van, they would almost certainly be rammed themselves immediately afterwards by the centre of A's fleet, and, supposing them to pass through without collision, they would, whatever they did, be subject to a superior fire.

If B's leader ordered a course at right angles to A's directly he saw him alter course, their fleets would intersect each other's lines in about four minutes, supposing them 2,500 yards apart to begin with. In such a case, the leader of B would receive a very heavy fire from A's van, but if he escaped damage to his steering gear, he might ram one or more of A's van.

This would not be in accordance with gun tactics, but may be considered. No advantage to either side is apparent.

The possible case of one antagonist assuming line abreast was shown here by Vice-Admiral Sir E. Fremantle in 1886, when the line ahead was shown to have an advantage if passing through between two ships, and has been already alluded to.

The effect of damage likely to be incurred from an enemy's fire while approaching to ram is very difficult to estimate, and should exercise much influence on the decision of the question.

If B's leader took the course of attempting to ram A's van, he would in any case, as both fleets are going at a high speed, be undertaking a task requiring great skill and no accident to gain success, while if accident to his steering gear occurs at a critical moment, his attack would be disadvantageous to him.

Altogether it appears most probable that if one combatant turned off to bring his broadsides to bear, the other would follow his example at the outset of an engagement, unless some peculiarity in the vessels of one fleet pointed to the greater advantage of the other form of attack.

Some event of importance to one side or the other would sooner or later occur, determining the course of an engagement, by rendering it imperative to succour some disabled ship, and it would be futile to attempt to carry the movements further.

It seems clear, however, that if both fleets be supposed equal as regards skill in gunnery and numbers, advantage would remain with that side whose organization and experience of combined action

should enable it to preserve its coherence to a greater degree than its opponents, thus asserting a superiority of fire at various phases of the engagement.

A superiority of number would be a great advantage, especially if rams held in reserve until the torpedo and gun armaments of the hostile fleet had suffered material damage.

Concerning the part to be played by the cruisers in a battle between fleets, a greater variety of opinions may be held than as regards the movement of battle-ships. Having fulfilled their duty as scouts, it would probably be the object of both sides to keep them intact during the first onset.

One of their duties, no doubt, would be, as was suggested here by Admiral Sir W. Dowell, in 1881, that of saving life from sinking vessels.

An interesting question arises as to the possibility of a number of cruisers coping successfully with a battle-ship.

In sailing days, the smaller ship was endowed with such a large sail spread in proportion to her displacement that she always had the heels of the line of battle-ship. This, however, is no longer the case: the smaller ship has to carry engines and coals, and, when a sea gets up, is less capable of maintaining her speed than the heavier battle-ship. Thus the cruiser is simply a vessel in which speed in smooth waters and Q.F. guns are the prominent features, while protection even to vitals is reduced to a minimum to avoid the necessity of heavy displacement, and enable the number of vessels capable of going at a high speed for a moderate expenditure of coal to be augmented.

It is not difficult to conceive circumstances in which high free-board battle-ships would be faster than cruisers; but, on the other hand, in smooth waters the cruisers would have the advantage in that respect.

If we suppose four vessels of the tonnage of the "Latona,"<sup>1</sup> armed with Q.F. guns, and engaging in smooth water, when they would have a superiority of speed, and there would not be much difference in the steadiness of their gun platforms, engaging, say, one on each quarter and one on each bow of a battle-ship from a distance of 3,000 yards, their superiority in light guns would be such that all the unarmoured parts of the battle-ship would suffer severely.

It would, however, be impossible for the cruisers to sink the battle-ship, except with a torpedo, while the battle-ship's heavy guns might destroy the motive power of a cruiser, supposing them uninjured by the lighter projectiles. Should the battle-ship's heavy guns be disabled, she would be at a great disadvantage. On the other hand, if one cruiser's engines were disabled, she would be at the mercy of the battle-ship. If the cruiser succeeded in disabling the battle-ship's armament, they could torpedo her in all probability.

It may be remarked that four "Latonas" represent less displace-

<sup>1</sup> "Latona's" tonnage, 3,000; armament 2 6" B.L., 6 4.7" Q.F., 9 smaller Q.F. guns; cost about 173,000*l*.

ment and cost than our "Royal Sovereign," though the cost of maintaining the four vessels would probably be greater.

Whatever view may be taken of this, it is possible that a squadron of cruisers might be employed to act the part of torpedo-boats rushing past battle-ships at night, or after they were to some extent disabled by an enemy's fire.

To guard their fleet against such attempts or to make them against an enemy would be the lot of cruisers, and would probably lead to cruiser actions. The Commanders of cruiser squadrons would have most onerous and exacting duties, as they would have in many cases to divine the intentions of the Commander-in-Chief, and act on their own judgment for the general welfare.

Should a hostile squadron of torpedo-boats appear, the cruisers would have to deal with it, and, doubtless, much might be done in peace manœuvres to afford young Officers an insight into probable tactical dispositions in war with the movements likely to result therefrom.

The Q.F. gun is likely to produce many vacancies, and while great care and discrimination may have been exercised in the selection of the Officers who are to conduct a fleet into action, it is very possible that those who survive to bring it out may not be gifted with the same ability and experience, and therefore it appears most desirable to extend a knowledge of tactical requirements as widely as possible among the Officers. If midshipmen are acquainted with the tactics in favour when they are under tutelage they are more likely to keep pace with the age they live in, and note the various changes incidental to novel or improved weapons.

From this point of view, the annual manœuvres now carried out by our fleets are most useful and instructive.

Having endeavoured to indicate the possible course of a naval engagement between single ships and fleets, taking the gun as a paramount weapon of offence, but allowing the torpedo a most decisive influence on the tactics observable in the first phase of the conflict, it would appear that the following consequences may be expected to result from the greatly-increased rapidity of fire due to the introduction of the Q.F. guns.

If the zone of effective fire be limited at sea to 2,000 yards, it is clear that the possibility of traversing that zone without receiving a large number of projectiles has disappeared, and as it appears that one nation, at all events, has adopted smokeless powder for service afloat, this deduction becomes doubly justified. The prospect, therefore, of a fast torpedo vessel passing through the zone of fire of a battle-ship during daylight and clear weather is quite a forlorn hope.

Success in naval battles will, more than ever, depend on the effective working of the guns, which is, in turn, largely dependent on the tactics employed.

The first effort will, no doubt, be to disable the offensive power of the enemy by striking his guns and torpedo tubes; and, in the progress of such an artillery duel, a very large number of the guns' crews may

be expected to be disabled, so that the practice of filling up vacant places becomes more than ever important.

In the rapidity with which guns can be fired, we have a means of ascertaining the range approximately, likely to be more practically useful than any range-finders.

It will be expedient not to lose a chance of using the heavy guns, as their shell will exercise a most destructive effect on the unarmoured parts of ships even when fired from positions whence the armoured portions are not penetrable, and it is by no means clear they may not be disabled by light shot striking on the chase.

The fire of Maxim guns and rifles from tops is likely, as pointed out here by Commander Lowry, to be of great efficacy in subduing the fire of all upper-deck guns.

In an action between fleets, the control of gun fire will be very important, both to avoid waste of ammunition and also firing at friends; but it will not be expedient to exercise that control by any other means than through the Officers of quarters, as all mechanical and electrical means of conveying orders or firing guns from a central position are exceedingly likely to be rendered useless by the first hostile projectile striking a ship, unless they are entirely under armoured protection.

For the same reason it appears very desirable that the power of firing torpedoes by sight from the tubes themselves should be arranged for where possible, and it may be remarked that submerged torpedo tubes, such as are fitted in some ships, gain in importance, as the installation cannot be attacked by hostile projectiles. The means of firing them, however, if not conducted under armour protection, should be so arranged as to be independent, if necessary, of broken wires.

As regards construction, the first point that occurs is that the introduction of the 6-inch Q.F. guns as the probable limit to the size of that type of weapon will give stimulus to the endeavours to armour ships sufficiently to keep out the shells from that nature of gun, and the accounts of some recent experiments seem to promise that the last word of armour has not yet been heard.

The much-discussed question of belted *versus* internal protection for armoured cruisers must be alluded to. If a ship will not float or stand upright, and her machinery and steering gear cannot be kept intact, she is obviously unfitted to play the part of a war-ship, but I think the question of the relative merits of the competitive kinds of protection as regards the stability and buoyancy of the ships may best be settled by naval architects.

Mr. Bile's paper on the subject, read at the Institute of Naval Architects in 1887, and the discussion thereon, is most instructive. It seems worth considering whether the belt, if it extends up to the level of the battery deck, is not likely to protect the gun platforms, and hence the offensive power of the ship, better than the internal protection, which will allow shells, striking at any angle, to pass through the side, and, bursting, may probably dislocate the gun racers and pivots.



Most Officers I have spoken to prefer the belt, but where adequate thickness can be given to the internal protection, there is much to be said in its favour except as stated above. The risks incurred by war-ships in action are so numerous and various that it is easy to exaggerate one, at the expense of others.

Coal may be advantageously utilized for protection, but can never be a wholly satisfactory substitute for armour. It is required most above water, and when the supply below is used, it may be necessary, for the maintenance of stability, to empty upper bunkers. A ship dependent on coal protection with her upper bunkers empty would be at a great disadvantage in meeting an enemy, at the end of a voyage, just come out of a port.

The Q.F. gun then seems to afford another reason for increasing the displacement of war-ships to enable them to carry an amount of armour sufficient to afford protection to their vitals and gun platforms against 6-inch shells. When the cruiser of the present day is contrasted with the offensive powers installed on board her, the contrast from the position in the days of wooden ships is very marked. Except in the single risk of fire, the guns of the day are far more powerful to destroy the structure which carries them than they were forty years ago. So long as ships are pitted against ships, the conditions on both sides are equal, and mutual destruction probable, but if ships are pitted against guns on shore, unarmoured ships do not appear to be so favourably situated as in the days of wooden ships.

The thin steel deck-houses which occupy the centre of the deck in cruisers would furnish a large number of fragments when struck by shot or shell, and guns placed on the poop or forecastle appear to occupy a more favourable position in that respect than those in the waist. The space taken up by air-shafts and funnels is, necessarily, large, but it may be well to restrict structures in wake of gun batteries within the narrowest limits, and to use mechanical ventilation where possible to reduce such structures to a minimum so as to free the batteries as far as possible from such sources of langridge.<sup>1</sup>

Next in importance to the buoyancy, motive and steering power of the ship, comes the means of exercising control over the two latter powers. These are usually concentrated in a conning tower, a somewhat conspicuous object, by no means in unarmoured ships impenetrable to quick-firing projectiles. It was once remarked by an Officer of great experience that the conning tower should form an integral part of the armoured structure of a battle-ship. When it does so and is capable of resisting 6-inch Q.F. projectiles, its weight is justified and its conspicuousness less important. When, however, as in an unarmoured cruiser, it is merely an excrescence showing in a pointed way whence the ship is controlled, but incapable of protecting the communications even within it against 4.7-inch or 6-inch projectiles, which communications are necessarily exposed to risk over a considerable distance, for the purpose of bringing them to this con-

<sup>1</sup> I saw fragments of brass rubbing pieces on main bitts of "Agamemnon" go through three parts of funnel casing on quarter-deck on October 17, 1854.

spicuous point, it certainly does not seem likely that the conning tower in unarmoured cruisers will survive the early impressions of the Q.F. gun.

If you cannot protect a thing, do not point out where it is, but place the communications as much as possible out of danger, and afford the Officers controlling the ship such shelter in an inconspicuous manner as may be feasible.

The effect of shells on unarmoured structures is well known, and to carry up steering rods and telegraphs through unarmoured structure into a small thinly-armoured apartment in a conspicuous position appears to me a mistake.

The fate of the "Huascar's" conning tower was such as to cause much reflection as to the expediency of devoting weight to such structures. All the communications being there, it must perforce be occupied unless the still more vulnerable position of ordinary navigation be occupied, and both of these positions have the disadvantage of affording conspicuous marks to an enemy's gunners. I am speaking more especially of the rods and telegraphs, damage to which at once renders the conning tower useless. The men may be replaced, but one shell among the communicating rods will probably render them useless for that action.

The object sought would rather, it appears, be attained by the principle of concealment, or avoidance, as Admiral Colomb has called it, and on shore we hear much more of pits for guns than of towers.

The wires for lighting a cruiser internally are likely to be cut frequently in action, so that no reliance should be placed on electric lights for any places required in action.

Loth as we may be to place armour on a ship, in view of its inutility against torpedoes, yet Q.F. guns, smokeless powder, and high explosives renew the old cry of "Keep out the shells," and would appear to make its application to a limited extent most desirable in all ships designed for war purposes.

The great difficulty caused by the high freeboard necessary for the maintenance of speed in a seaway is that the area to be armoured becomes so large as to make it impossible to cover it all, but it seems a question whether the central portion of cruisers should not have a belt sufficient to keep out shells in combination with the internal arrangements generally made use of for other parts of the vessels.

With the object of defeating torpedo-boats, a number of torpedo-boat catchers are now built to which speed is essential, while a very light armament will suffice, more especially as rapidity of fire is much more important in their case than anything else. Such vessels are very useful for the purposes for which they are designed, but it should not be forgotten that, no armour being possible on their displacements, they are unfit to engage protected vessels, and so long as they possess superior speed in smooth waters to torpedo-boats, they are sure to be yet more swift in proportion when a sea gets up.

As regards protection to the guns' crews, everything that appears feasible as regards shields may be seen in progress in our workshops.



It is a great thing to place guns so as to reduce the risk to the crews as much as possible to the direct hit, and avoid the inevitable shower of fragments which must be caused by a shot striking neighbouring structure.

From the foregoing imperfect review of the salient points of the results of introducing Q.F. guns, it would appear that in naval actions it will be most important to develop as heavy a fire as possible for a short time, with a view to which as many guns of adequate power should be mounted as possible. Coals will have to be replenished so often that other stores can be filled up at the same time, and all available weight devoted to offensive power.

It is impossible not to sympathize with the naval architect of the present day whose ships are a mark for such destructive weapons, both above and below water, that it is most difficult to see in what direction progress lies.

Where a theatre of war will admit of small vessels maintaining their speed, and the base of supply is near at hand, economy may result from the employment of moderate sized vessels, but where high seas prevail and base of supply is distant, we may be sure large displacements will be essential to efficiency, and must be prepared to pay the cost. No doubt the practical rule to make our ships somewhat superior to those of our possible enemy may suffice, if we are certain that his requirements in war and our own are similar, but this is a matter of practical statesmanship.

The only satisfactory point about the vast expenditure now incurred in all countries for the manufacture of war material appears to be that hitherto it has resulted in the maintenance of a far larger population than it has ever destroyed, with which reflection, not perhaps a wholly satisfactory one to the objects of destruction, yet a decidedly good feature to dwell upon, I must conclude my lecture.

Comparative Table of Guns.

Ship.	Description of gun.	How worked.	Weight of projectile.	Results.
"Bomby" .....	16-25-in. 110-ton B.L. ....	Hydraulic	lbs. 1,800	3 rounds in 6 minutes, starting from gun loaded.
"Trafalgar" .....	13-5-in. 67-ton B.L. ....	"	1,250	4 rounds in 9 mins. 7 secs.
"Colossus" .....	12-in. 45-ton B.L. ....	"	714	4 rounds in 6 mins.; target struck 3 times.
"Thunderer" .....	10-in. 30-ton B.L. ....	Hand	500	1 round in 2 mins. 10 secs.
"Impérieuse" .....	9-2-in. 22-ton B.L. ....	"	380	5 rounds in 6 mins.
Cruisers .....	6-in. 5-ton B.L. ....	"	100	1 round a minute.
Cruisers and battle-ships .....	6-in. 5-ton Q.F. ....	"	100	5 rounds in 55 seconds.
Cruisers .....	4-7-in. 2-ton 1 cwt. Q.F. ....	"	45	12 rounds a minute.
Torpedo-boat catchers	3-75-in. ? 25-pr. Q.F. ....	"	25	12 to 15 rounds a minute.
Battle-ships and cruisers .....	6-pr. Q.F. Hotchkiss. ....	"	6	25 rounds a minute.
" .....	3-pr. Q.F. " .....	"	3	30 rounds a minute.
" .....	1-pr. Q.F. " .....	"	1	About 30 rounds a minute.

Figures derived from "Modern Naval Artillery" and Major Clarke's "Fortification."

The CHAIRMAN: We have listened with great pleasure to this lecture, and a very instructive one it has been, particularly as it deals with a subject which none of us know anything about practically, whatever we may know theoretically. I am not sure that it is not one of those subjects where "When ignorance is bliss it is folly to be wise." I hope, as there are some naval architects present, they will take part in the discussion. We shall be happy to hear them.

Admiral Sir GEORGE WILLES, K.C.B.: I do not wish to take any part in the discussion, and will leave it to younger men. The lecturer tells us, at page 3, that the "Shah" was not fitted for ramming. I do not believe that the "Shah" has a cutwater. I do not think any ships had cutwaters since the "Black Prince" and the "Warrior." In my opinion, every modern ship is capable of ramming, and, like Admiral Long, I have never been able to understand why the "Shah" did not try to ram the "Huascar"; and after the statement of the lecturer as to the number of shots fired from the "Shannon" and "Chesapeake" which were effective, I do not think the "Shah" would have been much damaged by the "Huascar's" fire. The lecturer quotes the opinion of Admiral Bourgois. I knew him very well. He had the reputation in the French Navy of being a purely scientific Officer, and most unpractical. I do not think we ought, therefore, to attach too much importance to his opinions.

Lieutenant STURDEE: I did not expect to open the discussion, but I appear here as a torpedo-boat Officer, and I do not think that torpedo-boat Officers often have a hearing in this Institution. Sir William Armstrong's firm have made rather a large statement, which is quoted by Admiral Long; it may have done for exhibition purposes, but I do not think it can be ever borne out in a practical way by actual results. I have taken part in several torpedo attacks, and no doubt there are others here who have done the same; I know that Admiral Long has taken part in many himself. What I would like to point out is that there are several points in that statement that are not borne out in practice. The first one is the statement mentioned that a torpedo-boat can be seen at 1,700 yards. That I am sure is not practically true; of course I am referring to a night attack. The second statement is, that the use of smokeless powder is assumed; that is a condition we have not yet reached. The next thing is, it does not take any notice of the accuracy of the fire, which is a very important thing; neither does it take any notice of firing into a friendly ship. It is stated that if, instead of three Service 5-inch guns, the ship were armed with three of the quick-firing guns, she could fire seventy-two shots in two minutes, but none of them probably, excepting the first few, would be aimed shots at all. It would take a very good gunner to make good practice under the circumstances, with his ship rolling and the boats continually altering their bearing and distance, and probably steering different courses. To take these points in more detail: as to the first point about *invisibility*, I think if you look through the number of torpedo attacks that have occurred, you will find, in the majority of cases, the boats have not been seen at distances over 1,000 yards, and in many cases they got nearly alongside before anyone knew they were there. I have seen cases of that, and have known cases where the boat, in a single ship attack, has not been seen, and it has actually come alongside, and made fast, and the men come inboard without being discovered. The Umpires in the manœuvres, I know, have a very difficult task to decide on different points, but if I may venture to offer a suggestion, there is a time limit now which tells very hardly against torpedo-boats. I fancy the reason is that everyone in the ship, from the Captain downwards, feels it an indignity to be put out of action by a little "mosquito," probably barely one-hundredth the tonnage of the ship, and as the time is taken from the first gun, which there is no rule should be aimed at the boat, and probably in many cases to the "cease fire" bugle, it is probably stretched in favour of the ship. This, I am sure, is felt by every torpedo-boat Officer, and I humbly suggest that the conclusions arrived at are not those that will probably be obtained in actual war. Might I suggest that the claims be kept by the Umpires until after the manœuvres, when both sides would have had a chance of a hearing, and then certain points be allowed for each case? I think some arrangement of this sort would enable a more correct result to be arrived at, which, I feel sure, is one of the main objects of the annual manœuvres. When you are discovered the cry is "Torpedo-boat!" What is the

first thing that happens? A gun is fired off to take the time by. The first gun is never pointing at the boat. The torpedo-boat Officers can see better than the men and Officers of the ship, and it is a proverbial fact that the gun is generally fired on the wrong broadside, and quite irrespective of the position of any friendly ships, and as the friendly ships occupy a very much larger arc of training for the gun than a little torpedo-boat, the friendly ships, I believe, will suffer more than the boat. There is one case in point at Plymouth. The first attack, in 1890, came in through the eastern entrance, and the second through the western one. The firing for the second attack was started from the eastern end of the Breakwater, which could have been of little or no effect.

Admiral COLOMB: I rise to order with regret, but I am always afraid, in this Institution, of seeing discussions turn off in the wrong direction. It is very easy just now to get on the torpedo-boat, and the lecture is not on the torpedo-boat attack.

Lieutenant STURDEE: I beg pardon. I was trying to point out the rôle of quick-firing guns *versus* the torpedo-boat. As to the quick-firing guns, it seems to me that, after the first boat is seen, the electric light is probably put on that boat, and the other boats coming in are not seen, and therefore a large number of unaimed shots are fired in any direction. To take the case referred to by the lecturer, the attack on the "Blanco Encalada" by the "Almirante Lynch" and the "Almirante Condell." The facts, as taken by one of the Officers of the flag-ship, and also the Captain of the "Almirante Lynch," seem to be these:—Fire was opened after the "Almirante Condell" fired the second torpedo; the "Almirante Condell" then cleared out, and the "Almirante Lynch" was 600 yards off, and came in and fired her first torpedo within 150 yards. They went full speed astern, to save ramming the "Blanco Encalada." The "Almirante Lynch" put her helm hard-a-port. Before firing the second torpedo four minutes had elapsed within 150 yards of the "Blanco Encalada," that ship being armed with two quick-firing guns and one or two Nordenfelts. The actual effect on the "Almirante Lynch" was this: there were four hits—two under the poop and two forward—and one man was wounded. These four hits were of practically no importance. Then they went out and met the "Aconagua." There was an engagement of forty minutes at ranges between 3,500 and 500 yards. The number of shots fired were—the "Aconagua," 160 shots; the "Almirante Lynch," 407; and the "Almirante Condell," 200. The "Almirante Condell" was not hit at all; the "Almirante Lynch" was hit three times. One Nordenfelt bullet struck her close to the water-line opposite the boilers, and one 3-pr. struck the water-line aft and one forward, so that they were practically uninjured. The "Aconagua" was hit seven or eight times, all in deck-houses and awnings, not one actual hit in the hull. Then there have been experiments as regards firing at sections of torpedo-boats, and you will find that, in each case, there have been but very few hits in proportion to the number of rounds fired. Judging by the hits on the target at night-firing, I do not think the superiority of quick-firing guns is borne out by the facts. They act very detrimentally in the way of intensifying every false alarm, which are in the proportion of three to every real attack, and a large amount of ammunition is often expended on those occasions. The result is, the ships may possibly run short of ammunition before a real attack takes place. Admiral Long referred to the torpedo-catchers. Whether they are the best way of catching the torpedo-boats depends of course purely upon the quick-firing guns, and if the effect of quick-firing guns is so great that they can sink the torpedo-boat, of course the torpedo-catcher is the best way of catching the torpedo-boat. If the torpedo-boat has a very large superiority of speed over the torpedo-catcher, I doubt whether it is the best way of catching the torpedo-boat. I was glad to hear Admiral Long speak very highly of the submerged tube. Of course we have been driven down to submerged tubes by quick-firing guns, and that is one great effect of the introduction of quick-firing guns. In the case of the "Royal Sovereign" class, a beginning was made to protect her above-water tubes, but for Admiral Long's suggestion for second-class cruisers to run the gauntlet, the above-water tubes require a little more protection than they have at present.

Vice-Admiral Sir EDMUND FREMANTLE: As my name has been alluded to two or three times in a friendly and complimentary way by the lecturer, I should like to

say a few words. The first thing that strikes me in his lecture is that it is very complete. There is a great deal of thought in it, and I am quite sure, though we may not entirely agree with him as regards what ought to be attempted in meeting an enemy, that there is a great deal of study and thought in it, and we shall learn a great deal from it. The next thing that strikes me is that we do not see, in this Institution, a large number of young Officers. I am sorry to say this Institution does, to a great extent, lack young Officers, especially of the Navy, who naturally are not very much in London. I make these remarks because the lecturer observes very properly that a question of tactics and a question of quick-firing guns, or of torpedoes, or of any other question connected with warfare, is one which should be studied quite early and young, and I think that those who do begin that study earlier and younger than most of us did, will have a very great advantage. It is, perhaps, unnecessary for me to allude to it, but Captain Mahan's recent work<sup>1</sup> touches very closely upon the question of naval Officers thoroughly studying questions connected with war. He has stated very truly, as it seems to me—it is well thought out like everything in the book—that English naval Officers were very frequently very fine seamen and very good Officers, or thought so in peace time, but that they occasionally failed and failed curiously in action from want of study of naval war. He mentions this more especially with regard to Matthews' action of 1746. The next subject with which I think we shall all agree is the question of conning towers. I entirely agree with the lecturer that it seems a very strange thing that it should be so, that the naval architects should have insisted upon gathering together all the necessities for the management and fighting of the ship in a conning tower which is not defended properly from the projectiles which will be showered upon it. There is the excuse, of course, that quick-firing guns did not exist when most of our ships were laid down, and that has made a very great change, but we see, even in the case of the "Huascar," the extreme danger of having everything brought together in one spot which was not protected. It would seem to me that, after all, anything would be better than that. I recollect the story of a Yankee who was giving his experience of what had happened in the American Civil War. He had been in command of a turret-ship. A lady said to him, "Oh, no doubt you always were inside the turret." "No, ma'am," he said, "I was not inside the turret." "Oh, really," she said "then where did you get to?" "Well, we were generally attacking forts," he said, "and I got on the lee side of the turret so as to have two thick-nesses of armour to protect me instead of one." Then there is the question of the armament of cruisers. I think, when people talk of having a very large number of cruisers instead of our large battle-ships, they do not sufficiently think of the question of their respective armaments and the protection afforded. It has been brought to our notice very properly by the lecturer, and still more clearly in the work on fortifications by Colonel Clarke, that the cruisers built now, though they carry unquestionably a good armament, but having necessarily great speed, they have very little protection and are very vulnerable. It is a satisfaction to us to think we need not consequently arm our coal-ling stations quite so much as was thought to be necessary a few years ago. At all events, I perfectly agree with the lecturer and Colonel Clarke, that the armament of our cruisers is such that the strength of a cruiser is only sufficient to fight its own equal, and that she is not of much value against a fort. There is another question of detail, certainly, but I think we have all been trusting very much to the electric light, and as the lecturer has shown us, it is an extremely dangerous thing to trust to implicitly in action. I think we should always have some alternative means of lighting ready instead of trusting entirely to the electric light. This refers more particularly of course to unarmoured cruisers than to vessels where the electric light is so entirely protected as in some of our first-class battle-ships. We have had recently in the papers a considerable discussion on the question of torpedo-boats, and torpedo cruisers. I do not propose to go into that now, but it does strike me that the remarks of the lecturer are as true and just in that case as they have been in most of the lectures which he has given us, and that is, that if our torpedo cruisers are to compete with

<sup>1</sup> "The Influence of Sea-Power upon History." By Captain Mahan, U.S. Navy.

torpedo-boats they should have certainly equal if not greater speed. I quite admit that as a rule torpedo-boats, after steaming a certain time, say six hours, can no longer go at the speed which we see on paper, and very often the cruiser of 19 knots may catch the boat of 22—in fact, I am under the impression she generally will, but still the time will come when the torpedo-boats will run out of harbours and be at their best, and they will run at 22 knots. It will be idle, under those circumstances, if the water is smooth and the weather fine, to send torpedo-boat catchers after them, which can only go, say, 19½ knots. It was not my intention to take much part in this discussion, but as my name was mentioned so many times I thought it right to do so. There is one other point to which I should like to allude, which I think the lecturer has brought clearly before us, that is, that we must in future, in the beginning of an action, as far as possible avoid presenting our broadside normally to the enemy, and that we must show more or less an angle, and engage partially bow on, and that the position of 45°, which I think he seems rather to lean to on four points, was one which was especially favourable as enabling you to use all your guns on one broadside, whilst at the same time not being placed in a position normal to that of the enemy.

Captain MAY, R.N. : Admiral Long has brought so many subjects before us that I shall try, as far as I can, to keep to the question of change. The quick-firing guns have come in : what change has been introduced ? I think Admiral Long has shown forcibly that any change goes to the benefit of the gun. We have three weapons—the gun, the ram, the torpedo. The gun has now been greatly improved, that is to say, it is more important than it was five years ago, and therefore our change must be in the direction of considering that the power of the gun has increased and we must regard it more. First of all, as to tactics. The only fleet action under comparatively modern conditions that I know of is Lissa. There the ram came to the fore—Admiral Tegethoff found the ram his winning weapon ; he charged down amongst the enemy's fleet and defeated them. That seems to me reasonable and rational. You think the ram is superior ; so you charge down amongst the enemy to use it. As far as I understand Admiral Long, he thinks now that the gun has so much improved we cannot do that any longer. We must begin, I understand him to say, by keeping off from the enemy until our superior gun-fire has given us some advantage when we may go into close quarters. If that is so, the problem is how are we to do it ? I must say, having tried to follow Admiral Long's diagrams, I have not succeeded in forming any opinion as to how, if I were disposed to remain at 1,000 yards, and use my guns, I am to keep off from another fleet who wanted to charge and use their rams. Questions of that kind appear to me to be constantly coming up, and as far as I can see they cannot be studied entirely on paper. We want to study them at sea. We tried in a small way, when I was in the Red Sea, to do something of the kind in boats, but it was not very satisfactory. Still I thought we learnt a little. It does seem to me that we do want some tactical school. It has been recognized that although gunnery can be learnt in a seagoing ship, and torpedo work also, still we want schools to study everything new, and to keep everybody up to the mark. And it does seem to me we want something of the kind in tactics, or seamanship, if you prefer to call it so, at our ports, where those problems could be worked out, and young Officers instructed as to what is right and what is wrong. That seems to me a necessity of this change. Then there is another thing which appears very necessary. We hear a great deal of the word "fire discipline." In the Army a rapid-firing weapon has been introduced on shore. The power of small arms is greatly increased, and it is found by all armies that the result is to throw more responsibility on the junior Officers, the company and battery Officers, corresponding with our Officers of quarters, and that what they call "fire discipline," that is, control and direction of fire, is therefore of increasing importance. And so it appears to me that that is another necessity of this change, that we should pay more attention to the control of fire. Lieutenant Sturdee told us how lightly a torpedo Officer regards our fire as it is at present, and I am sorry to say I agree with him to a great extent. Admiral Long has told us that the quick-firing gun is its own range-finder, and I believe if the Officer, having his men in perfect discipline, can keep control over the fire, though we may not be able to stop torpedo-boats, at any rate



we shall be able to make it rather hot for them. With regard to stopping a boat, I may say I agree with Lieutenant Sturdee, because, if we look back to fighting in the old days, a 32-pr. loaded with grape ought to have stopped a pulling boat. It seldom did so, and the boat often pulled alongside a ship without very much damage, and I believe the same thing will happen again. Then one word about keeping your ships in an oblique direction. Now-a-days that we have so much curved armour, turrets, barbettes, redoubts, and the much-abused conning tower, I do not think the oblique direction is so important. If a shell comes in on the bow,  $45^\circ$  from the line of keel, and bursts, the splinters will diverge another  $45^\circ$ , and will rake the deck, going nearly fore and aft, whereas if the shell comes in directly abeam, you only get your angle  $45^\circ$ , and probably only one gun on the fighting side is injured. I think that is important, and we cannot afford to disregard it. As regards construction, may I say one thing? It appears to me that there has been some little confusion as to the number of hits a ship will get, because a quick-firing gun has been introduced. I take it the number of hits a ship will get in action depends upon her endurance. Admiral Long told us the "Chesapeake" received 56 shots, and then struck. Then I would say the endurance of the "Chesapeake" was 56 hits, and that it did not matter twopence to the "Chesapeake" whether those hits came from quick-firing or slow-firing guns; as soon as she received 56 hits, she must strike. If that is so, it seems to me that in considering the question as to whether a conning tower is sure to be hit it does not matter whether the enemy has quick-firing guns or not. The 56 hits will be distributed all over the ship in either case, and the conning tower will be hit either by slow or quick-firing guns. Of course the action will take longer with slow-firing guns, but the hits on the ship will only be one number. But if a ship with quick-firing guns meets a ship with slow-firing guns, then of course the 56 hits come in very much sooner than the slow-firing ship can get 56 hits on the enemy, and she will undoubtedly have to strike. As to armour, if the guns are so important, what we want, it appears to me, is more armour: that means more displacement. That I should gather would be the change which quick-firing guns have entailed on our shipbuilding. The gun has to be resisted, not the torpedo or the ram so much, and armour will resist the gun. Now if we take the cruiser whose conning tower Admiral Long talked about, she has no armour that will resist quick-firing guns of the present day. The conning tower which was abused was made to resist the quick-firing guns of that day; unfortunately it does so no longer, and therefore now you are in the same position that you were in the days of the unarmoured frigate—the whole of the cruiser, conning tower, and everything else is practically unarmed. The only thing we can do is to put armour; then she gets bigger and becomes an ironclad. We must steer the ship from somewhere, we must steer her from above water, and is it worth while to put gunproof armour on the conning tower alone? We cannot do it. The only alternative appears to me to be to have several stations from which you may steer the ship, and if one is knocked away you can go from one to the other.

Admiral COLOMB: This lecture is on "The Probable Influence of the Introduction of Quick-firing Guns on Naval Tactics and Construction." We are not discussing quick-firing guns *per se*; we are simply examining the position that quick-firing guns will give you so many more shots per minute—whatever it may be—above others, and what is the result of the rise in the speed of firing. That is the point, and we get it, I think, at once in the two "Piemontes." We see there the key of the position, which subsequent speakers quite agree with. We see it is perfectly evident that you cannot get a rapid fire from the bow position, but you can get a rapid fire with your guns from the broadside position. The result is that the effect of the greater amount of fire in a given time, which necessitates assuming the broadside position, is a matter of importance. But that really was always so, and we had always taken it in that point of view. I want to say about the paper itself, that, like everything else that comes from Admiral Long, it is clear, incisive, and lays down principles which, in his opinion, ought to be carried out. My experience on this question is, that, with a careful working from point to point, inductively, as it is called, you are bound to come to the truth, even though you do it only on paper. You cannot complete the truth on paper, but you can approach

it so as to show what your next step ought to be when you get beyond paper. I cannot help dwelling upon that, because I think Admiral Long has again laid down principles which have been laid down here before, and he has shown that those principles have become more widely acknowledged than they used to be. I take the influence of the ram on formations. We are told to-day, and it is important to note these things, because they help us to trace the causes which are to produce the results—we have been told, and as far as I can see most of us have agreed, that the ram does not influence formations in the first instance, but that it is at a later part of the battle that the ram comes in. But that again is twenty years old. I said in this Institution, in 1872, writing on "Attack and Defence of Fleets," "Those who think with me will observe the instinct of the naval world has led it to contemplate the end-on position for hostile fleets, not as the best means of attacking with rams, but as the best means of frustrating an attack of rams. Our opponents will take the opposite view. The latter party will maintain that the ram dominates and prescribes the formation, which is so good a defence against it, that the ram is not the chief weapon in fleet action. And the inefficiency of the ram as the chief fleet weapon, once the end-on position is firmly established, seems to me to be argued by other considerations, which I have not yet seen treated by any writer on tactics." Then again, "Naval strategy, therefore, while it dictates an attack by the ram by single ships as the most effective means of obtaining the victory for him who is most skilful, does not seem to advise that policy in a fleet attack. You must beat your enemy in some other way." That goes to show that it is not the advance of the torpedo which has thrown the ram back, but it is in the nature of things that the ram should be thrown back by the steps taken in defence. The battle of Lissa was mentioned. What made the ram powerful in the battle of Lissa was not the ram itself, but the unskilfulness of the people who met it. If the Italians had turned towards the Austrian fleet that threatened to ram, there would have been no such disaster as happened. Another point which I look upon as most important with regard to the ram, and which was noticed by Admiral Bourgois, although here again it was referred to twenty years ago in this Institution, is where it was shown that the *support* or *guard* was everything. In No. 3 Diagram, the rear ship threatens any ship attempting to ram the leader, and from my point of view prevents the attempt being made. Admiral Long rather spoke as if the *support* would act after the enemy had attempted to ram. From my point of view the work is done by way of threat, sufficiently complete to prevent the enemy from thinking of ramming. It was said, also twenty years ago, when there was only the Harvey torpedo, that the result of the action of the torpedo must be to bring the guns forward. Here we have it pretty well acknowledged that that is so. Then as to the question of doubling upon the enemy, that also I had the honour of bringing forward here, showing that in succession you can double, and that that was the way to do it—in succession, instead of simultaneously, as Nelson did. What I want to impress upon you is, if you will, as Admiral Long has done, follow out these things clearly and distinctly, even on paper, you are bound in the end to come to just results. You need not make mistakes, because if you take your subject from every point, and look at it from every point, you will find probably a mistake one way is corrected by a truth the other way. Twenty years ago I came to the conclusion, which remains unchanged, that to bring the enemy four points on your bow was an important position for you to take up, that you were safer thus than you could be in any other way. You force your enemy to disclose his intentions, which is everything to you, and in disclosing them he gives you, perhaps, the opportunity of taking advantage of them. But we must never forget that, in tactics, all we can really aim at is equality. You must always understand, whatever arrangement you may make in the way of getting an advantage of your enemy, he has an equal power of getting an advantage of you, and all you can do, if you are equally skilful, is to fight on an equality. In other words, your care must be to prevent the enemy taking an advantage of you, rather than to hope to take an advantage of him. Sir George Willes said a word with regard to Admiral Bourgois, which I do not quite agree with. It is perfectly true that Bourgois was a paper man. He was a great mathematician, and a most scientific man, but if you look into what he has



written, you will see most of the things with regard to this question that we now accept.

Admiral Sir EDMUND FREMANTLE: Will you explain the 4-point bearing?

Admiral COLOMB: You bring your enemy four points on the bow. It is too long a story to go into now, but it will be found in the journals of twenty years ago. I was very glad to hear Admiral Long speak out strongly against the *mêlée*. It is an abomination, a thing that no English Officer ought ever to dream about, or think about. It was an idea brought in by Admiral de la Gravière, as if it was a thing that could not be helped, but, as Admiral Long has pointed out to us to-day, the Admiral who has his fleet in proper command will not have a *mêlée*; he will take care to keep his ships together, *coute qui coute*, and to withdraw for a time from the battle to re-form, rather than allow them to get into a *mêlée*, where it is impossible to say who is to win. The value of the 4-point bearing is shown by "Sagittarius" on the diagram. She has taken the quarter 4-point bearing, which comes to very much the same thing, and you see by doing so she has put her enemy at a disadvantage, unless she also takes up the bow 4-point bearing. "Aries" is making the mistake because she does not see what her game is. After she has got pounded of course she does, but not at first. I think the "Shah" did not ram first of all, because she was not really a ram; she had no doubt a spur of some sort, but it was thin iron. Moreover, I do not quite agree with the lecturer in saying it would be very easy for her to have rammed the "Huascar." As far as I have gone into the matter, turning power more than speed has to do with effective ramming in a duel; not, perhaps, in other cases, but in a duel. It might have been a very good thing that the "Shah" did not try to ram, because she might have got it the other way. The value of the line-ahead remains, as far as I can see. I do not see anything to shake the belief I have held for twenty years. It need not be a long line, but, as far as I can see, the man who takes his fleet into action in a line-ahead, moving through the enemy, or passing the enemy, has an advantage.

Sir EDWARD FREMANTLE: Admiral Long does not go into action in line-ahead.

Admiral COLOMB: It is a narrow front.

Admiral FREMANTLE: It is subdivisions—quarter line.

Admiral COLOMB: A narrow front of great depth, which is the general term for expressing "line-ahead," but then we must recollect, as it was very properly put by Captain May, you cannot guarantee that the enemy will meet you as you want him; you cannot guarantee that his fleet will stand towards you. Most likely he will not. If an enemy is determined to make you fight an artillery duel, I think he will turn his stern and fight it out that way. It is only in the cases where the advance is mutual that you get the order of battle that is shown *there*. There are, I consider, five distinct modes in which fleets may fight, and you cannot guarantee any one of those modes, but you can prepare for all of them. As to conning towers, I very much agree with the lecturer. Shortly before I retired from the Service, I had to go closely into it for the Admiralty, and I came quite to the conclusion that we should not have a conning tower in any of our ships. What we want is simply two or three good stout shields on each side of the deck that will keep out a 3-lb. or 6-lb. shell. Simple shelters for the Captain, or whoever is in command of the ship, and for the navigating Officer. Let them seek the position where they will have most shelter. Inside each shield there should be a tube of large diameter, and, below the water line, engine and steering telegraphs should be collected. The orders would then be given by word of mouth down the tubes.<sup>1</sup>

Mr. BARNES: I may state that the "Shah" was not a ram; she had merely a stem with a wooden backing, sheathed over with copper. You could hardly say that she had a stem at all prepared for ramming.

<sup>1</sup> Note.—In trying to take a great many heads in a short time, I failed to put the general lesson of the lecture as I wished to do. Its points are:—(1.) The confirming of the theories of twenty years back. (2.) The maintenance of the gun in the first position. (3.) The effect of the torpedo in delaying action at close quarters. (4.) The bringing out by means of the quick-firing gun, into practical relief, twenty years old conclusions, namely, that naval power lies in a numerous artillery on the broadside, and not in small numbers of very heavy guns at the ends.

Captain CURTIS: Moreover, the "Huascar" was the more handy ship.

Admiral CLEVELAND: I concur in a great measure with the paper. I think, however, it has a narrow standpoint, and I regret that the lecturer has associated "Construction" with "Tactics." As I understand Tactics, the tactical problem is how best to apply *existing* matériel in such a manner as to develop the offensive as well as defensive powers of the ship or ships, viz.: the ram, guns, torpedoes, and armour protection. That is the tactical problem, and the "Construction" is thus so far settled for us. I need hardly say how necessary and how important this question of tactics is, and I quite agree with Captain May in thinking it desirable that some steps should be taken to form a "School of Tactics." I am very strongly of that opinion because, before we can satisfactorily discuss the best tactical formation, we must lay down certain broad principles as to the composition of the squadron—the number of battle-ships, the reserve, coal, ammunition, and torpedo dépôt ships; their speed and armament (primary and secondary), and also their torpedo armament (whether our battle-ships are to have torpedo tubes in them, or whether they should be relegated to torpedo gun-vessels in attendance). Then, again, the question of powder—is it to be black or smokeless? Also again, what ships are to be attached to battle-ships—are they to be cruisers? as our lecturer says—or, are they to be torpedo gun-vessels? These are matters which affect the movement of the ship, and therefore the tactical formation of the squadron. Are the steam-boats, especially the 2nd class torpedo-boats, to be hoisted out, or left in the crutches to be destroyed? And further, when these important factors in the problem have been authoritatively laid down, and the best tactical formations (varying with those of the enemy) based upon them, threshed out in "The School," they should be confidentially communicated to Officers in command for their guidance. I do not agree with Admiral Colomb as to the "line-ahead" being the best for attack. I do not profess to be a tactician, but I do think an échelon formation lends itself better to the development of the heavy fire of the battle-ship, and that is a most important thing. I agree with the lecturer with regard to the maximum distance at which we should open fire: 2,000 yards for guns and 600 yards for torpedoes. It of course gives very little time (one minute, both squadrons moving at, say, 10 knots) for reloading, and we should only get one round from our heavy guns before the two squadrons were abreast! The arguments of the lecturer are based upon that table of practice from quick-firing guns which I think will be found to be rather roseate. No doubt, these results have been obtained under favourable circumstances, but my experience leads me to infer that, under Service conditions, we should not get the same results from the quick-firing guns that are recorded there. The term "quick-firing gun" has, so far, lost its meaning. When it was first introduced into the Service, it was a gun which had "fixed" ammunition, and that was a very well-defined line. Now our 6-inch and 4.7-inch quick-firing guns do not have "fixed" ammunition. Relatively speaking, they are quicker firing than their corresponding calibres with the old ammunition, but I think the method in which their ammunition is made up will shortly be adopted for every gun in the Service, and the so-called "quick-firing" guns limited to those which use fixed ammunition. I beg to express my thanks to the author of the paper.

The CHAIRMAN: When I first went to sea, there were two classes of ships in the Navy, the Symonites and the anti-Symonites. Sir J. Graham, when First Lord of the Admiralty, said, "that with the exception of religious controversies, he did not know anything so bitter as the controversy which raged between the Symonites and the anti-Symonites." Now-a-days the controversy seems to be in much the same condition between the torpedoes and the anti-torpedoes, but we shall have to wait for the next war to settle the dispute practically. With regard to the "Shah," I think Mr. Barnes settled that matter. She is not properly a ram. There is one important point that we very much lose sight of in these days, and that is the mischief done by splinters. To show you how our forefathers were well aware of it, in 1708 two privateers, under Captain Woods Roger, went round Cape Horn, and I remember reading that part of the gunner's duty was to clear away certain portions of the woodwork, the reason given was that more people were killed by splinters than by shot. Sir Edward Codrington, writing of Lord Howe's victory on the 1st of June, 1794, mentions Lord Howe sleeping under the poop for

three nights before the action, not a single bulkhead up, and only a simple canvas screen. The reason he gave was, that the cabin was kept clear of anything that would make splinters. At the Battle of Navarino, 1827, the late Sir H. Codrington, then a mid. in the flag-ship, writes, "It was a lucky thing for us that the ships were undermanned in those days, and that we were not able to spare any crews for the guns in the cabin, as the Admiral's cabin, after the action, was a mass of splinters," and he mentions four fowling-pieces, lashed together in the cabin, being struck by a shot; in one, the barrels were separated, and pieces of the splinters were found out in the poop. That shows the extraordinary damage splinters may do. In my opinion, all boats should be lowered, if possible, before going into action, as we saw done in picture of engagement in the last great war, and all booms should be cleared away, and everything that might cause splinters, or burst a shell.

Admiral LONG (in reply): I do not think I have very much to say. I must consider myself fortunate, considering how very little qualified I am to deal with these questions, that I have not been treated more severely. With regard to Sir George Willes' reference to Admiral Bourgois, I may say that I read his book, and I was very much struck with the way in which he anticipated what has subsequently happened. I do not know what he did afloat; I only knew him by his book; I never met him. With regard to what Lieutenant Sturdee said, I am sure I hope we shall be able to persuade him to give us a lecture, but I quite agree that a very large deduction from the figures in this paper would have to be made if you wanted to arrive at how many shots are likely to hit anybody. That is a question which it is almost impossible to discuss. You can only say a quick-firing gun, if fired five times as fast, is at all events likely to make five times as many hits as other guns. Admiral Colomb said, some years ago, that about 2 per cent. might be expected to hit, and of course that 2 per cent. will now represent a much larger absolute number than it used to. Beyond that we cannot go. The attack of a torpedo-boat against quick-firing guns would, no doubt, take place at night, and I quite agree with Lieutenant Sturdee that at night it is not to be supposed the accurate practice will be made at sea, at all events, that is anticipated in that table, or probably anything like it. It can only be taken relatively as showing that whereas you could do certain things before, now you can do a great deal more. The flat trajectories of modern guns, however, are likely to produce much greater effects than the grape shot of old days. With regard to what Captain May said about study at sea being necessary, I must entirely agree with him there. I think these matters can be followed out on paper to a certain point, and then, if two ships are at sea together, they can, if they choose, work it out practically, and get absolutely accurate results as to those particular ships. I think that was a very important remark made by Captain May as to fragments. Of course he speaks with full knowledge of that point and should be attended to. With regard to what Admiral Colomb says about his lectures in times past, I entirely endorse all that. I may say, that his lectures were the first things that induced me to pay any attention to the subject at all, because, in the ordinary course of service afloat, such matters are not brought before us, and I think that is one of the great advantages in favour of this Institution, that these matters are brought before everybody, and young men, as they go on, get hold of things which stir them up to work out these questions. With regard to what Admiral Cleveland said, I think I said in my paper that I did not anticipate that the torpedo-boats would accompany fleets. Of course that was meant to cover hoisting boats out as well as first-class boats. That appears to be generally understood. The French appear to have come to the same conclusion, as the result of their manœuvres in the Mediterranean, that torpedo-boats were more trouble than they were worth directly they got away from land. But torpedo-boats will play their own part from their own bases. I am quite aware that the tactics I put forward must necessarily be imperfect; they are simply the result, in my mind, of what I have heard and seen done and read on the subject, and I hope it may be of some use to others beginning the thing to make a start with. I am very largely indebted certainly to Admiral Colomb and many Officers I see here—Sir William Dowell, Admiral Fremantle, Admiral Willes, and others—for the knowledge that I possess on the subject. I thank you very much for the kind way in which you have received my lecture, and Admiral Sir Vesey Hamilton for taking the chair.



Friday, February 5, 1892.

GENERAL THE RIGHT HON. SIR REDVERS H. BULLER, *M.C.*,  
K.C.B., K.C.M.G., Adjutant-General to the Forces, in the Chair.

### MILITARY BALLOONING.

By H. B. JONES, Lieutenant R.E.

GENTLEMEN,—It is not my intention in this lecture to allude to the past history of military or civil ballooning; it has already been done here by Colonel Templer and Lieutenant Baden-Powell, and at Aldershot last year by Colonel Elsdale, and I propose to simply discuss the questions relating to the proper equipment for military balloons and their use in war.

I think that it is now satisfactorily established that balloons will play a very important part in any future campaigns, and be of the greatest service if properly used, and we and all the great Continental nations are experimenting to obtain the most compact equipment.

The first question which arises is how is the balloon with its accessories to be transported on service to where it is wanted, and I will begin with the question of gas.

The three gases at our disposal for inflating the balloon are: (1) Hot air; (2) coal gas; (3) hydrogen.

(1.) *Hot air* is practically out of the question; its lifting power is very small, and a heating apparatus for keeping up the temperature inside the balloon is necessary. This is dangerous enough in a free balloon, but in a captive balloon, which is tossed about by the force of the wind, it is practically impossible. The only possibility of its being used would be if the gas supply failed, and it was a matter of great importance to get a balloon up even for a very short time.

*Coal gas* has a lifting power of about 35 lbs. per 1,000 cub. feet, and has the advantage of being easily procurable at many places in any civilized country; it is also very cheap, which accounts for its general use by civilian aeronauts.

*Hydrogen* is a much more costly gas, but its lifting power is from 60 to 68 lbs. per 1,000 cub. feet, and therefore for military purposes, where economy in transport is of the highest importance, it is very valuable.

The amount of gas in the balloon must be sufficient to lift the envelope of the balloon and its fittings, two men, the captive rope, and a supply of ballast, and, in addition, there must be a large amount of buoyancy to withstand the effect of the wind, &c.

The cubic capacity of the normal English war balloon is 10,000 cub. feet, which is, I consider, the minimum. The French use a balloon of 540 cub. metres or 19,000 cub. feet, and transport must be provided for this gas.

The plan of filling the balloon and towing it to the required spot is only feasible when the distance is not great, and would be out of the question on any expedition when the troops would be away from the base for more than a few days, and we are reduced to the following alternatives, viz.:—

- (1.) Carrying the gas ready made under pressure.
- (2.) Carrying the materials and plant and making the gas when required.

In considering (1), it is obvious that the large volume of gas required must be compressed on account of the transport, and in designing a gas holder the following requirements have to be considered:—

- (1.) *Strength* to retain the gas under a high pressure.
- (2.) *Lightness* to obtain the maximum of gas with the minimum of weight.
- (3.) *Adaptability* to any kind of transport.
- (4.) *Power* of transporting large or small quantities of gas as required.

Some of these points are antagonistic; for instance, it would be a saving in weight to carry the gas in very large receptacles on wagons, but then it would be impossible to get along with pack animals, or to take only a small supply of gas.

The English were the first to adopt the plan of carrying the gas ready made, and I will explain the details later on. I will merely state here that each gas tube weighs about 70 lbs., and carries 120 cub. feet of hydrogen. 4 wagons carry 140 tubes, or an equivalent of about 17,000 cub. feet of hydrogen, and the total weight, including wagons, is about 9 tons. The tubes weigh  $4\frac{1}{2}$  tons.

We will now consider the alternative method of carrying the materials and plant for making the hydrogen.

Of the various ways of obtaining hydrogen, the most general is by the action of dilute sulphuric acid on iron or zinc. The gas obtained from using zinc is purer and therefore lighter, but iron is more easily obtained.

At Chatham, 6 gallons of acid and 70 lbs. of zinc give 500 cub. feet of hydrogen. This is much above the theoretical amount, but in rough generators, &c., the excess is necessary, especially when time is of importance; therefore, to get the 17,000 cub. feet, which in the other way is carried on the wagons, we require  $(70 \times 34)$  lbs. = 2,380 lbs., about  $21\frac{1}{2}$  cwt. of zinc, and  $(6 \times 34)$  gallons of acid = 204 gallons =  $2,040 \times 0.98$  lbs. This gives, allowing for waste, about 2 tons of material.

Captain Espitallier, in a treatise written by him, lays down that 8 or 9 kilos. of iron and acid is required per cub. metre of gas, which gives approximately  $4\frac{1}{2}$  tons of material for 17,000 cub. feet.

*Sulphuric acid* is awkward stuff to handle, and will eat away any

substances it may be spilt over, and would, therefore, require a specially constructed cart for its transport. In addition to this weight there is the weight of the generators and other plant for making, washing, and cleaning the gas, and the weight of the wagons themselves, and, taking everything into consideration, it seems that, at least for the first 20,000 cub. feet of gas, it is easier to carry it compressed.

The following are the chief advantages of the system of carrying the gas compressed:—

(1.) *Rapidity of Filling.*—With the normal English war balloon, the whole process of preparing the balloon for an ascent takes from fifteen to twenty minutes, but, if the gas had to be made on the spot, it would take about four hours, during which time the opportunity of gaining valuable information might be lost or a change of weather arise, and the force be saddled with a half inflated balloon unless the gas were wasted.

(2.) *Purity.*—During the process of compression a great proportion of the impurities in the gas are got rid of, and we therefore obtain a gas with higher lifting power.

(3.) It is not necessary, as in making the gas, to be close to a stream or river. In the process of manufacture a large amount of water is required, which in many cases could not be obtained.

(4.) Owing to either a leak, however small, in the balloon, or to the variations of temperature and pressure, there is always a daily loss of gas, which is easily made up by putting in a tube of gas; but if the gas has to be specially manufactured, it may cause considerable delay.

Against the system of steel tubes there is the fact that they may be destroyed by the enemy's fire while on the march, but this seems to apply equally to the acid cart or to any of the generators, except that the latter could be patched, while the tubes, which have to stand great pressure, cannot be tinkered up in any way.

Again, with the compressed gas it is necessary to keep up a supply of full tubes from the base to take the place of the empty tubes, and a pumping station must either be fitted up at the base, or a good supply of loaded tubes taken out from England. The latter plan was adopted when a balloon equipment was sent with the Bechuanaland Expedition.

As during the five years in which I have been connected with military ballooning I have been accustomed to the carriage of the gas ready made and compressed, I am no doubt prejudiced in favour of the system, but I have done my best to deal fairly with both systems.

#### *The Balloon and Fittings.*

I will next consider the question of the balloon itself. The wind is the great enemy of captive ballooning, but it is precisely captive ballooning which is most useful for military purposes. The wind tends not only to put a great strain on the materials, but the balloon requires great buoyancy to rise against it, and so a shape which



presents the least resistance to the wind is most advantageous; the cigar-shaped balloon would appear the best, with a rudder to keep it head to wind, but the great difficulty is to keep the shape of such a balloon rigid unless it is full of gas, and at present I do not know of any Power that has left the old spherical form for captive work.

In considering the material of the envelope, we come to one great disadvantage of hydrogen, which I have not mentioned before, that is, its diffusibility, which is two and a half times as great as coal gas; we therefore require a material very light, but very close in texture; that most commonly used is silk, coated with certain varnish, and this has been adopted by the French. The Germans use a cotton material coated with india rubber; we use a different material, which gives very good results, but which I am not at liberty to discuss.

With regard to the component parts of the balloon, after duly considering safety, everything else has to give way to the question of weight. I have already mentioned that the size of the normal English military balloon is 10,000 cub. feet, and, as hydrogen lifts about 65 lbs. per 1,000 cub. feet, this represents a total lift of 650 lbs.

Two very light men will weigh, say, 280 lbs.

The balloon must be able to take up at least 1,500 feet of rope, weighing, say, 100 lbs., and therefore there remains only 270 lbs. for the weight of the balloon and its fittings and for the buoyancy required to make it rise and withstand the force of the wind.

I do not think it is advisable to go into the detail of the various parts of the balloon, such as the valve, hoop, net, &c., but for the benefit of those who may be anxious to know what accommodation is provided for the aeronauts, I will mention that the car is made of wicker work, and weighs about 20 lbs.; it is provided with two small seats, and is  $3\frac{1}{2}$  feet long,  $2\frac{1}{2}$  feet broad, and  $2\frac{1}{2}$  feet deep, which cannot be said to err on the side of luxury.

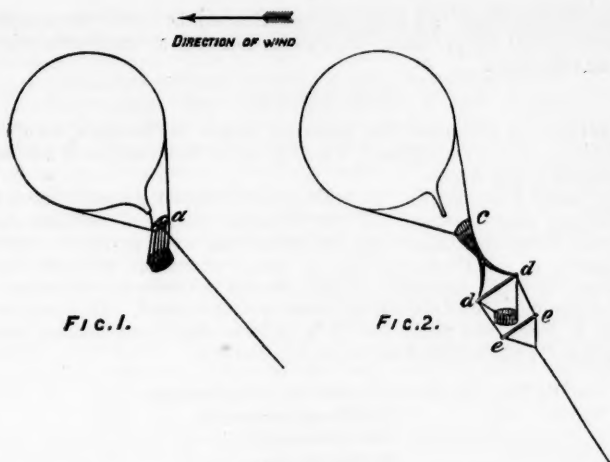
The balloon when packed fits with its net and most of the fittings into the car.

There is one point of detail which I will go into, as it has a certain amount of bearing on the comfort of the aeronaut, and so affects the accuracy of his observations; it is also a marked difference between some foreign equipments and our own: I allude to the method of connecting up the car and the captive rope to the balloon.

Fig. 1 shows the method of attachment used by us, Fig. 2 that used by the French.

In Fig. 1 the net comes down to a hoop, *a*, and the car is suspended from the hoop by six car lines of sufficient length to give plenty of head room from the hoop to the bottom of the car. The captive rope is attached to an eye just below the centre of the hoop. In Fig. 2 the net lines are brought down to a small hoop at *c*, and thence down to the extremities of a trapeze, *d*, from which the car is suspended: a second trapeze, *e*, connected with the first trapeze, swings below the car, and the captive rope is connected to it. The advantages claimed for the French method are that when the balloon is deflected from the vertical position the movement is not transmitted to the car so much as in our method, and also that the captive rope





is clear of the observers. I have no personal knowledge of the system, but the drawbacks to it appear to be increase of weight and the difficulty of reaching the balloon from the car.

In the English method the aeronaut can easily get from the car through the hoop to the tail or lower extremity of the balloon, and, as a matter of fact, our car is so small and cramped that when two men are making an ascent one of them usually sits on the hoop, the netting forming a comfortable hammock.

Having disposed of the gas and the balloon, the question of the captive rope arises.

As the balloon ascends, it is continually raising a great weight of rope, and at the same time losing its buoyancy owing to diminution of the barometric pressure, so that the rope must be as light as possible; it must also be strong, as it has to hold the balloon, bear the weight of the part below any point, and stand the sudden jerks of the wind; but, on the other hand, excessive strength is dangerous for the following reason: if the violence of the wind is to break anything the rope is the thing that should go first; an involuntary free run is not to be desired, especially with the wind blowing towards the enemy; but, if the captive rope holds, either the net or balloon itself tears; if the first, the balloon escapes and the remainder, including the aeronauts, falls at once to the ground; if the second, the balloon may parachute and check the rate of descent, but it is not an experiment to try often.

The rope adopted by us answers the double purpose of a guy rope and a means of communication. It is made of steel wire in seven strands, each strand consisting of twelve wires and a string core; in the centre of the rope there is an insulated wire for telephone work.

The circumference is  $\frac{3}{4}$  inch, and breaking strain 1 ton; the weight is rather over 1 oz. per foot. The wire itself acts as the return wire for the telephone.

*Balloon Section.*

Having now discussed the principal points to be dealt with in designing a balloon equipment, I will go on to the position of affairs at present in the Army.

For many years training in balloon work was done in the summer at Lidsing, near Chatham, but the Officer in charge of balloons was the only recognized balloonist; the Subalterns were posted to dépôt companies at Chatham, and lent in the summer, and the men also belonged to dépôt companies, so that, except for three or four months in the summer, the Officers and men were scattered. However, on April 1, 1890, the formation of a balloon dépôt and section was sanctioned, and the numbers were as follows:—

Balloon Dépôt.—1 Instructor in ballooning.  
1 Military mechanist.  
1 Engineer clerk.  
6 Other ranks.

Balloon Section.—1 Captain.  
2 Lieutenants.  
1 Company sergeant-major.  
1 Sergeant.  
23 Other ranks.

The transport of the section consists of six wagons, each requiring four horses. They comprise—

1 Balloon wagon.  
4 Tube wagons.  
1 General service wagon.

All these wagons are converted from general service wagons to avoid special fittings as much as possible.

The balloon wagon carries at the tail of the wagon a drum on which is wound 2,500 feet of wire rope; the drum is fitted with a strong brake, and with handles at each side for winding in the rope; the telephone connections are carried from the drum to a box in which are the telephones. The rope runs from the drum through a pulley, which, by means of a ball and socket joint, follows any movement of the balloon. This joint is connected to a screw shaft which causes it to travel from one end of the drum to the other, and ensures the rope being evenly distributed. There are two boxes in the middle and front of the wagon which carry ropes and all the necessary small stores; these boxes when closed serve as seats for the men carried on the wagon. The balloon packed in its car fits between the two boxes.

The balloon wagon in foreign equipments carries a small vertical

engine, and the rope is run off or wound up by machinery, this makes the wagon very heavy, and we find that steam power is not necessary.

Our balloon wagon can carry twelve men if required.

The tube wagons carry the supply of gas for the balloon. The tubes are made of mild steel; they are 8 feet long,  $5\frac{3}{4}$  inches in diameter, and  $\frac{1}{8}$  inch thick; their cubic capacity is 1 cub. foot, and they are loaded in peace-time at a pressure of 1,500 lbs. to the square inch or 100 atmospheres, so that each tube carries 100 cub. feet of gas. In war-time the pressure is increased to 1,800 lbs. or 120 atmospheres, and each tube carries 120 feet of gas. The average weight of a tube is 70 lbs.

Each tube wagon carries 35 tubes; they are arranged longitudinally in five rows with the nozzles pointing to the rear, and are connected up to a wooden chest lined with copper, into which the gas passes, and is then carried to the balloon by connections which are put on when required. The tubes are kept steady by light iron framework, which is unfastened when the tubes are empty and have to be unloaded. Each tube is turned on separately, and the contents of three wagons can be run into the balloon simultaneously.

The weight of a loaded wagon is 43 cwt.

To show the ease with which these tube wagons can be loaded and unloaded, I may mention that during the cavalry manoeuvres last year I started from Frensham Common at 6 A.M., and took three tube wagons loaded with empty tubes to Farnham railway station, a distance of about 4 miles. The full tubes were taken from the railway trucks and loaded on the wagons, the empty tubes unloaded and placed in the trucks, and the wagons sent back to Frensham, and the balloon was filled and ready for an ascent at 9.30 A.M. The road was very hilly, and the wagons were only taken along at a moderate pace.

The tubes are in no way dependent on the tube wagons; the balloon can be filled from tubes arranged on the ground, or the tubes may be carried in ordinary carts or slung on camels or other pack animals.

Of course, it is most important to have a good valve for the tubes, and this I can safely say we have got; the outflow of gas can be regulated with the greatest nicety, and during the operations in Bechnanaland and Egypt I believe there was not a single case of leakage from the tubes. The tubes are tested before delivery by the manufacturers and afterwards periodically with a water pressure of from 2,700 to 3,000 lbs. to the square inch.

The general service wagon is of the usual pattern, and carries all the reserve stores, the most important being a spare balloon and a spare coil of the steel wire rope.

Although fully equipped with wagons, the balloon section at present possesses no horses; these during peace-time are supplied by the field depot and other mounted units of the Royal Engineers at Aldershot.

*Mobility.*

The opponents of captive balloons are very fond of advancing as an argument against them that they are useless unless they are kept stationary; but this is not the case. I do not wish to damage my case by claiming too much, and will frankly admit that it is impossible to tow a balloon against a strongish wind, but in a light breeze, or with a favourable wind, a balloon has no difficulty in keeping pace with infantry, and frequently can go much faster. To judge of the mobility of a balloon by the results obtained during peace manoeuvres in England is a very unfair proceeding. The climate is more against ballooning than that of most countries, the country itself is very cramped, and, greatest enemies of all, we have the laws of trespass and claims for damages to deal with.

The two great difficulties are telegraph wires and trees; for instance, in moving a balloon from the South Camp, Aldershot, to the Fox Hills, a distance of about  $2\frac{1}{2}$  miles, there are two railways with wires on each side, and two other lines of wire to cross, and this is not an exceptional case.

With a side wind, high trees by the side of the road are a great trouble, as the rope gets foul in the trees. In peace one has to keep to the road for the sake of the crops, but otherwise the natural thing would be to get on the lee side of the trees, and, if necessary, keep the balloon low down under their cover. Roads where the trees meet overhead are very nearly impassable, as the rope cannot get through.

In good open country the balloon is let up on the wire rope from the wagon, and towed along at any convenient height, depending on whether the balloon is required at the time for observing purposes, and also on the fact that the force of the wind often varies at different heights. On roads where telegraph wires and trees are frequent the balloon is towed by two ropes, which can be fastened to the drum on the balloon wagon till an obstacle is reached. If this is a telegraph line or similar obstacle, the object is to hold the balloon with one rope while the other is got over the wire; if the wind is in the same direction as the line of march the aeronaut hauls up one rope clear of the wire; the balloon, held by the other rope, drifts with the wind over the wire, and the first rope is dropped over and secured. The second rope when let go swings over of itself. If the wind is against the balloon the first rope must be thrown over the wire from the ground. Plenty of practice is required to carry out these operations smartly in a wind, and I think it speaks well for the sappers in the balloon section that in three summers' work at Aldershot the only damage done was that on one occasion two wires were put in contact for ten minutes.

*Communications.*

It is most important to ensure prompt communication between the balloon and the ground, and this is got by using the telephone, the

wire for which runs through the main wire rope; the distance is never much over 500 yards, and by using the Siemens-Halski patent we avoid the necessity of a battery. A very convenient method of sending messages and plans from the balloon is by aid of a small canvas bag which is weighted and provided with a split ring at one corner; the message is put in the bag and the ring run round the rope, and the weight of the bag makes it run down the rope to the ground. When this only is used the aeronaut must arrange a code of signals to say when he wants to rise or descend or be hauled down. Communication can also be kept up by flag signalling. Whenever the telephone is not connected up and the wagon is in motion, a man should ride some distance away from the wagon. I know nothing more annoying than shouting "Halt" from the balloon at the top of one's voice while the men are all round the wagon, the noise of which prevents their hearing one.

*Observation from the Balloon.*

It is a very common error for people to fall into to assume that, because the balloon is a good place to reconnoitre from, that, therefore, to send good reports from a balloon is a very easy matter, and that any Staff Officer can go up in a balloon and at once be able to report what he sees to the General. I maintain, on the contrary, that nothing requires greater practice. Except on very calm days, there is always a certain amount of movement which is very trying to most untrained men and affects them either in the head or the stomach; many a man who will be perfectly at home in the balloon on a calm day is rendered more or less incapable of sending in a good report, if there is any wind, by a feeling closely allied to sea-sickness. This motion of the balloon has also the effect of rendering it no easy matter to keep a field glass fixed on any particular object, and as the balloon should be at the least two miles away from an enemy, this is of great consequence. On making a first ascent, one of the remarks most usually made is, "Why, the country looks just like a map," and this is perfectly true, but, unfortunately, nature has omitted to mark the hill features by contours in red. As the balloon ascends the slopes gradually flatten out, and the country looks like one flat plain. The result of this is that the observer is apt to fall into the mistake of assuming that movements which are plainly seen by him are also seen by his General, and that a report of them is valueless and a waste of time, whereas the movement may be totally hidden by a fold in the ground. Or from the same cause, except to a practised observer, many very important movements lose all their significance, or may be interpreted in a totally wrong way.

To the untrained eye it is very hard to estimate numbers correctly; a red patch two miles off is easily seen, but, unless the observer can give an estimate of the number of companies or battalions forming that red patch, the information obtained is of very little value; he must not only be able to approximate to the numbers but also give the constitution of the force, whether cavalry, artillery, or infantry,

or all three. Thinking it over calmly, it seems ridiculous that anyone should take a company for a battalion or transport wagons for field guns, but, speaking from sad experience, I know that both mistakes can easily be made. The observer must be fully acquainted with the formations and tactics of all arms of the Service to avoid sending useless and misleading reports. Again, with our small balloons, it is frequently necessary in windy weather to only send up one man at a time, in order to give the balloon greater buoyancy to rise through the wind; the observer must, therefore, have some practical knowledge of the balloon in case of accident. Nothing sounds easier than to say, "If you break away, pull your valve line to come down, or throw out ballast if you want to rise," but regulating this wants a considerable amount of practice; there is something very strange in floating quietly or being pitched about in space when alone for the first time, and to an inexperienced man the sudden jar caused by the balloon wagon going into a deep rut, or turning a corner too sharply, or from many other causes, may shake his nerves at a time when he particularly requires to be cool and collected. I have said that as the balloon ascends the country flattens out, but in parts where the hills are very steep and the valleys deep there are bound to be bits of hidden ground which the balloon cannot search, and in summer troops may lie concealed in woods for some time without their presence being noticed before they open fire; the only thing to do is to carefully watch these places for the first sign of any movement.

For a report of an enemy's movements to be of use it must arrive in time for his opponent to be able to take steps to meet the emergency; the report must, therefore, be put as concisely as possible, and the time at which the message is written must be stated; a rough sketch, showing troops with coloured chalks, is frequently much more useful and quicker done than any message, but it has the disadvantage that it cannot be sent to the General except by a messenger.

Arrangements must be made for the quick transmission of reports from the balloon wagon; these can be sent very quickly if a cable cart of the telegraph battalion is available; if not, mounted orderlies have to be used.

#### *The Use of Balloons in War.*

Balloons have not yet been used in a big war since they have been properly organized, and we shall be able to gain much information as to the correct way of using them when they have been given a fair trial.

The use of balloons at field days and peace manœuvres near Aldershot during the last three years has been a great advance on the old system of training at Lidsing, where the Officers and men were taught the management of the balloon in all weathers, but never had the opportunity of watching any forces manœuvring. I have already mentioned how hard it is for Officers unaccustomed to the work to send in good reports, and it is not surprising that, at the end of the first summer's training at Aldershot, the reports were considered un-

satisfactory, while the balloon working was reported as good. But though peace manœuvres are excellent training for the balloon observers, and do, to a certain extent, show to a General the capabilities of a balloon, I maintain that the results so obtained cannot be taken as a fair criterion of their usefulness. On active service the troops, when nearly in contact, have always to be on the alert, and it is at this period that the balloon will be specially valuable; a balloon is nothing but a scout, a means of obtaining information which may assist a General in forming his plans, and in every case in which the balloon has been utilized in this way the criticisms have been favourable; when a general action commences events follow each other in such rapid sequence that it is extremely difficult to send the information from the balloon in time for it to be of use unless very large forces are engaged; turning movements can and ought to be seen in time to be met; but, until I am convinced to the contrary by facts, I maintain that the great use of balloons in the field is in supplying information as to the disposition of the enemy's force before the engagement commences, and giving details as to the position of his camp. In peace manœuvres this cannot be fairly illustrated owing to the limits of time and space. On an ordinary field day orders are usually issued that troops are not to cross certain boundaries before a certain time, and the balloon is not allowed to ascend before that time; therefore the balloon goes up for the first time when the occasion on which it would be most useful has passed.

For instance, an attacking force has to advance at 9 A.M., and at this time the balloon is sent up with orders to report what force is occupying the woods in front of it, but by this time the defending force has occupied the woods, and is hidden from the balloon; a few men may expose themselves here and there, and the strength of the reserve in rear of the woods gives a clue to the numbers in the wood; but on active service the balloon would have been up hours before, watching the enemy occupying the woods, and accounting for every man. The only report that the aeronaut can send is that the woods are occupied, but he cannot tell the strength of the force, and therefore the report is practically useless. But, on the other hand, if the balloon were able to give this information, the field day might be checked at the very commencement.

I will give another instance: on one occasion the balloon was with the attacking force, and made the first ascent when the troops began the move; a regiment of cavalry advanced across the neutral line, and was promptly charged in flank and came under the fire of a machine-gun; the General directing the attack was close to the balloon, but it was impossible to warn the regiment. On active service the balloon should have given notice of this defending force at least half an hour beforehand.

As an example of the use of a balloon in watching an enemy, I will quote two instances: in the first, a fight took place in the morning between a flying column and a force from Aldershot; the flying column then encamped, and the balloon was left to watch them at a respectful distance protected by a battalion of infantry. The balloon



was connected with Aldershot by the T.B., R.E., and a report of the enemy's outposts sent in, which enabled a cavalry force in the night time to avoid all the outposts and get right into the middle of the camp.

Again, in the summer of 1890, a column was encamped on Pattenham Common, and the balloon from a distance of  $1\frac{1}{2}$  miles, and assisted by a squadron of cavalry, sent in an accurate sketch of the enemy's camp and the disposition of all his outposts, particularizing the regiments furnishing them as they differed considerably in uniform.

That during the fight itself the balloon may be of the greatest service when large bodies of troops are engaged is undoubtedly true, and is borne out by the fact that, during the last French manœuvres, General Gallifet, who commanded one side, remained in the balloon the whole time, and sent orders down to his Staff by telephone; nothing is said in the various accounts as to the strength of the wind, and we may assume that in this case it was a calm day.

Turning from the subject of field operations, I have usually found that even the opponents of ballooning allow that a balloon may be of the greatest assistance in correcting artillery fire, describing its effects, and giving particulars as to the construction of the various works, constructed or being constructed. In such cases every day something is going on, and even in unfavourable weather the balloon is bound to get a chance sooner or later. Here again the only practice that can be got in peace-time is carried out under circumstances which are very unfavourable to a balloon. For several years in succession the balloon section has been sent to Lydd for the artillery experiments; in the last two years the section went, at the close of the Aldershot manœuvres, and arrived just before the time of the equinoctial gales. I may mention, in case some of my audience have not visited it, that Lydd is close to Dungeness, and the ranges consist of a long expanse of shingle; it is exposed to every wind that blows, and a calm day is of very rare occurrence. The batteries are for the most part made of shingle, and harmonize completely with the surroundings, and there are absolutely no points to assist one in forming any idea of distance.

Usually we have drawn up a table giving the position of each round as observed by the balloon, the range party, and any system that may be on trial at the time; it is useless to imagine that at a distance of 2 miles or more observations from the balloon can hope to be as correct as those taken by the aid of theodolites; but with practice a very fair estimate can be made, and the large errors are always found when the shooting is erratic. These observations have always been taken when only one gun has been firing, and I think that when several batteries are employed any system depending on two separate observations would be very liable to go astray. Lastly, the balloon has the great advantage that, though the observer may give the position of a round as 50 feet over instead of 25 feet over, he can always describe the effect of a round fully and accurately, unless the slopes be very steep, in which case part of the interior of the work may be hidden.



If a battery is firing at an unseen target, the system of observing fire by any means but a balloon would be impossible in many cases. I have not hitherto alluded to the moral effect of the balloon, but, in some cases, it is very great. A balloon up in the air, however far off it may be, is still a conspicuous object, and many a man seeing the balloon is convinced that he himself is of necessity seen by it, and, therefore, he will not venture anywhere near. An instance of this occurred during the Aldershot manœuvres in the summer of 1890. The balloon was attached to a flying column encamped at Frensham; there had been a fight in the morning, and further operations during the day were unlikely; but, as it was very calm, a great many Officers made ascents during the afternoon. As it happened, cavalry scouts had been sent out from Aldershot to gain information; but on returning reported that they had not been able to get near on account of the balloon. These scouts were among the trees and houses, and were never discovered by the observers in the balloon.

The question of background is a very important one; the rifles are terribly hard to distinguish against the dark green of the pines; while they are very prominent if manœuvring on sandy soil like the Long Valley at Aldershot; red shows up fairly well, except on a few occasions; but the white shell jackets of the Guards or Highlanders are by far the most conspicuous.

#### *The Effect of Fire on Balloons.*

The mention of Lydd brings us naturally to the subject of the effect of fire on balloons, as it is at Lydd that all the experiments have been made. Here again we are prevented from drawing any sound conclusions, from the fact that the experiments vary so very much from service conditions. I will briefly describe the last experiment at which I was present. It was a very calm day, and the balloon was anchored on the sea shore at about 4,000 yards from the battery, it was fired at by one 13-pr. field gun, and the balloonists were sheltered in two splinter proofs. The balloon was let up on the wire rope from one splinter proof, and to this rope, at a distance of about 700 feet from the balloon, another rope was attached, and the end taken to the second splinter proof. The only means of altering the position of the balloon was by letting it up or down on the wire rope and hauling on or paying off on the subsidiary rope. The car of the balloon was weighted with sandbags, &c., equal to the weight of two men. The result of the experiment was, that it was not hit until the seventeenth shot; while falling it was again struck by another round of shrapnel, but fell quite slowly, and there would have been no appreciable shock. The damage done consisted of two tears from fragments of shell and various bullet holes through the envelope, and the car had two bullet holes through it. The balloon could have been rendered fit for use again in about two hours.

But I may venture to state that on service the experiment would be very different; the fire of at least one battery of artillery would be

concentrated on the balloon, and by varying the range and elevation of the different guns the dangerous zone would be very largely increased. On the other hand, if a balloon were being fired at, it would be let up from the wagon, and the latter kept in motion; the elevation would also be frequently varied. In the experiment alluded to it was only possible to vary the position slightly, as the men were not allowed to leave the splinter proofs, although so great was their interest in the experiment that they repeatedly asked to be allowed to do so.

A balloon should never be allowed, if possible, within the effective range of infantry fire, and taking all things into consideration, it appears that about 2 miles is the minimum distance at which it should be kept from artillery; one great point in the balloon's favour is the difficulty of getting its range, and to avoid any assistance being given, the balloon wagon should always be well under cover.

The effect of a hole or tear in the balloon depends greatly on its position; the gas having a tendency to rise, a hole below the great circle is not nearly so dangerous as a hole near the crown or top of the balloon; a few bullet holes would cause a certain amount of leakage, but could easily be stopped, but what the moral effect on the aeronaut would be when the shooting got so close I am unable to say. If there is much wind the balloon is likely to rip if a tear, such as a fragment of shrapnel would make, is started, and special precautions are necessary to check this.

#### *Free Ballooning.*

I have up to now only dealt with the question of captive ballooning, as it is by far the most important from a military point of view, but the military balloonist must also be trained to take charge of a free balloon—the siege of Paris affords many instances of how they can be utilized in war; but, besides the voluntary free run for taking out despatches from a besieged city, or some similar purpose, there is the involuntary free run which may happen from the breaking of the guy rope, either by a fragment of shell or by accident. In the latter case there would be no warning and the balloon would ascend very rapidly, as it would be suddenly relieved from the weight of part of the guy rope, and the aeronaut would have to act promptly if he wished to be of any further use to his side; for safety, the grapnel and rope and a little ballast should always be taken in the car of a captive balloon, ready for use in case of emergency.

In the case of a voluntary free run it would generally be necessary to travel a considerable distance to avoid being captured on landing; the limit of the run is reached when the ballast is expended, and practice is required to know the exact amount to use, so as not to waste any. The cost of hydrogen is against its use for frequent free trips, but I consider that in peace-time all the men in the balloon section should be taken as often as possible in larger balloons filled with coal gas.

*Military Ballooning in Foreign Armies.*

It is very difficult to get useful information about the equipment in other armies; the occasional paragraphs in the newspapers are unreliable, but I have a few facts which may be of interest.

*France.*

The following information is taken from "*La Revue des Deux Mondes*":—

"The balloon park is divided into two sections; the first comprises the balloon wagon and the tube wagons, which give to the balloonists a mobility equal to that of the troops on the march, and a supply of gas sufficient to fill the balloon three times.

"The second section comprises a small, movable gasworks, for making the gas in the rear, and compressing it into the tubes; it thus acts as a feeder for the first section.

"The process of filling takes from fifteen to twenty minutes. During the French Manœuvres in 1891, the French General Gallifet, at the battle of Colombey, remained in the balloon for about three hours watching the movements of the 5th and 6th Army Corps, and giving his orders by telephone to the ground, from whence they were transmitted by telegraph to the various staffs."

The chief feature to note in this report is that the French seem to have definitely adopted the system of compressed gas in tubes, according to the English plan.

The balloon wagon has a small vertical engine for paying out or taking in the wire rope, and weighs over  $2\frac{1}{2}$  tons, and with the old plan of making the gas on the spot the generating wagons were much heavier.

In the early part of 1884, a balloon equipment that did not require transport wagons was hastily improvised and sent to Tonkin. It was commanded by Captain Aron and consisted of 1 Lieutenant, 5 Sous-Officiers, and 21 non-commissioned officers and sappers; 30 marine artillerymen were afterwards attached. The equipment was packed in cases which could be carried by two or four coolies, and when the force went up the river it was carried in two junks, the balloon and stores on one, and the gas-making apparatus on the other.

The country was very much against towing the balloon, and high winds compelled it to be emptied on two occasions, but the section kept with the force the whole time, and the balloon rendered valuable assistance in correcting the artillery fire and reporting the movements of the enemy. The General himself went up and reconnoitred the town of Hong Hoa.

*Germany.*

The balloon section consists of—

- 1 Captain.
- 3 Subalterns.
- 50 Other ranks.

It is attached for administrative purposes to the railway brigade of the Engineers.

The balloon barracks and dépôt are in one establishment to allow of the men being close to their work. The balloon used for ordinary work has a cubic capacity of 380 cubic metres or 13,400 feet, but larger balloons are sometimes used; the material for the envelope is cambric coated with india rubber.

Balloons made of the same material as the English ones are under trial, but are not yet adopted; the attachment of the car and rope is the same as ours, and having tried both methods, they prefer it to the French method. Steel tubes supplied by Delmard and Son, who make for the English Government, have been experimented with, but the result is not yet known; at present the gas is made in a travelling generator which weighs about 3 tons. Zinc-dust mixed with hydrate of lime and formed into cartridges is placed in a furnace and subjected to a high temperature, and hydrogen is given off. About 1 lb. of the mixture gives 2 lbs. of hydrogen.

The wagon equipment consists of—

- 1 Wire wagon,
- 2 Gas generating wagons,
- 3 Wagons with the balloon and gear,

and in the field of 5 wagons with material for gas-making.

Constant practice is carried on all the year round, and a good deal of coal gas is used in larger balloons to save the cost of hydrogen. The men are frequently taken for free trips. The training and use of the balloons are left entirely to the Officer Commanding balloon section, who is personally responsible that everything is in order when required for peace manœuvres or active service.

A balloon section has also recently been started in Bavaria.

#### *Russia.*

In 1890 there was formed in Russia a balloon park, and in 1891 a fortress balloon section. From these will be furnished the field balloon parks. Both belong to the Engineers and are under the Inspector of electrical matters.

The instructional balloon park trains Officers and men, carries out experiments, takes charge of all stores, and on mobilization forms field parks. Its establishment is 1 Lieutenant-Colonel, 2 Senior Officers, 1 Adjutant, 2 Junior Officers, and 71 other ranks. In war-time this is increased by 8 Junior Officers and about 100 men.

Each year 4 Engineer Officers and 4 Officers from the fortress troops are attached for instruction. *Fortress balloon sections* will be formed as required. Each one forms in war three detachments, of which the establishment is:—

*Peace Establishment.*—1 Captain, 2 Subalterns, 44 other ranks, besides non-combatants.

*War Establishment.*—1 Captain, 4 Subalterns, 115 other ranks, besides 21 non-combatants. The 1st fortress section was, I believe, formed at Warsaw, and another is to be formed this year.

*Italy.*

The Italians in Abyssinia employed a balloon equipment closely modelled on ours, but they are now, I believe, trying balloons supplied by Yon, of Paris.

*Conclusion.*

In conclusion, I can only state that, although we have succeeded in obtaining a good portable balloon equipment, and can say that we have been the pioneers of the compressed gas system, there is still much room for improvement. The manufacture of steel is always advancing, and I hope before long that we shall be further able to economize in weight in proportion to the amount of gas carried. But, besides this, it is necessary to have a constant supply of Officers and men trained in balloon work so as to get the best possible results, and this training must take place somewhere where the management of the balloon and observation from the balloon can be combined. I have not touched on the subject of steerable balloons, as they are still in the future, and, when discovered, will render all the matter in this lecture ancient history.

Major BRERESFORD: The telegraph has been mentioned in connection with the balloon, and I think that it would have a very close connection with it upon the battle-field. We may say that the telegraph would be the errand-boy of the balloon, and I hope I do not insult the lecturer by suggesting that the balloon itself would form an excellent sign-post for the telegraph. My idea is that the foot of the balloon should be the centre for intelligence, you might say the telegraph exchange, and that by means of cable carts, radial lines should be laid in any direction that might be found necessary. For instance, a line to the nearest permanent telegraph station, and another to follow the General about the field (unless he chose to take General Gallifet's example, and remain in the balloon). It is always very important to know the whereabouts of the General, and to be able to communicate with him with the least possible delay. Anyone who wished to send or gain information, to ask for reinforcements, or to accomplish any of the objects for which communication is wanted, would, if they had not a field telegraph office close at hand, go to the balloon, where, I hope, they would find all the necessary means for getting into communication with the General, or with any other important point.

Captain HEATHORN (late R.A.): I should like to ask two questions. When the gas is released from the tube, is there any difference in temperature, is cold generated? Because we know that when compressed air is released, the vapour round about the valve soon becomes ice. I should also like to be informed whether any progress has been made in the navigation or the movement of balloons, either stationary or destined to travel about.

Colonel T. FRASER, R.E.: I think it would be interesting if the lecturer would tell us at what distance General Gallifet was from the artillery of the opposing force, at what distance he was allowed to remain in the balloon, by the French Umpire Staff on the occasion he mentioned. That would give us a clue as to what is the opinion of the French Army on the subject.

Colonel Sir ARTHUR MACKWORTH, R.E.: There is one aspect of ballooning I have not heard touched upon yet, and that is the use of balloons at night. Of course in the daytime, as the lecturer has told us, there are great difficulties for the aeronaut in recognizing the features of the country. As he said, the features are not shown by red contours; but at night I think the use of the balloon might be very great in discovering the approach of small parties of the enemy if there were some means of showing up the country from the balloon. I do not suppose it is practicable—I speak diffidently—at present, to use the electric light, but there

is a form of parachute light ball, which is now, I believe, almost obsolete, known as Boxer's<sup>1</sup> parachute light ball. It was fired from mortars, and I think that it would be found useful if thrown from the balloon over that part of the country where it was expected that small parties of the enemy were approaching. The parachute would slowly descend and burn for a few minutes at all events, and so give time for the observers in the balloon to report the movements of the enemy.

Major WATSON, C.M.G., R.E.: I should like to say a few words, as, not long ago, I had the opportunity of seeing something of German military ballooning. I was much struck with the practical way in which they worked, but, at the same time must agree with the lecturer that our field equipment is lighter, and more useful for rapid movement. The German equipment, consisting as it does of a heavy wire wagon, and also a very heavy apparatus for generating the gas, cannot compare for facility of movement with that adopted into the English Service. On the other hand, I think the Germans are ahead of us in the practical use to which they put their balloons, and the constant training which they give their Officers and men at all times of the year: even in winter when the snow is on the ground they always have the balloon out, and regard it as a very important matter to train their aeronauts to observe, not only in the summer months, but in winter, at night, and, in fact, under all the conditions of active service. In order to do this, they not only use the light hydrogen balloons, but larger balloons which are filled with coal gas, hydrogen being a very expensive gas, whereas coal gas can be obtained at a much lower price. The Germans consider it very necessary to train all their men in free work, as a man cannot make a good aeronaut unless thoroughly at home in the car and thoroughly prepared to go away free if it is necessary. There was one important point to which the lecturer alluded slightly, and that was the necessity of having the Officers well trained in observing. I know that some people think that any Staff Officer can go up and send down information, but to my mind it would be much the same thing as sending out a Staff Officer to reconnoitre who had never been on horseback before. I do not think that Staff Officer would bring much useful information back. And in the same way it is only those who have been frequently up in the car of the balloon, and know what it is like under various circumstances, who can realize how very different the aspect of everything is when seen from a height of 2,000 feet to what it is from a moderate height, such as in the field observatory. I do not think much need be done in the way of navigable balloons at present, although there is no doubt that in time they may be brought to perfection. For the moment I think there is plenty to do in getting the best use out of what I believe is, at present, the best portable equipment which is employed for military ballooning.

The CHAIRMAN: Before the lecturer replies, there are one or two questions I should like to ask. One is with regard to distances. I notice it was stated that a balloon, to be safe, should be at least 2 miles from possible artillery which might fire upon it, but the lecturer has not told us one very important thing, namely, how far he thinks the observer in a balloon can see, what amount of ground can be covered by him. I am quite sure what Major Watson says is perfectly true: if the balloonist observes at all, he must be exceedingly well practised in observing from a balloon. I should be rather inclined to doubt, considering how very movable the platform is, if any man could see much more than 4 miles, if so far. The other point which the lecturer has hardly emphasised as fully as I should like, is, whether we are not getting too light an equipment for our balloons. It seems to me, we have got almost the smallest margin we possibly can have between the amount we can carry, and the amount we want to carry. It is all very well to have the lightest and most mobile equipment, but I would ask the lecturer to show why it is necessary to have such a very mobile equipment. The very fact of the command one gets from a balloon would seem to point that it can be sent up from the most convenient place, and as long as it is tolerably mobile, and can be got along any road upon an ordinary baggage wagon, I should have thought a larger balloon, and, if possible, a gas-generating machine which would be available two

<sup>1</sup> Colonel Boxer, R.A.—Ed.



or three times over, and not like these tubes, have to go back to be filled up, would be preferable. Such an arrangement, I think, would be more serviceable in the long run than a very light equipment that will fill the balloon once, but once the balloon is filled, it must be left full always, or else the tube must be sent back to be refilled. On those points I think information would be a very good thing.

Lieutenant H. B. JONES, R.E., in reply, said: The first question I have been asked is, whether the temperature is much lowered when the gas is run out from the tubes. In answer to that, I can say that it is very much lowered; if, in opening the tube valve, the gas is allowed to run out at its full pressure, the orifice is frequently choked, the gas freezes, and will not run out until it has had time to thaw. With reference to the question as to the progress of steerable balloons, I am afraid I cannot give any very useful information. At present we have not been able to go into the subject much, and although we know that some foreign nations and private individuals are devoting themselves to it, they are naturally not inclined to give any information to outsiders, and what I have got I cannot repeat with any certainty as to its accuracy. It was not stated in the papers which I saw what distance the French balloon at the last manoeuvres was kept from the artillery of the opposing force. As regards the question as to what distance an observer can see from the balloon, it is naturally a matter which varies very much with the conditions of the atmosphere and the nature of the ground. I am informed by Captain Trollope that in Bechuanaland, with the balloon at an altitude of 1,000 feet, the range of vision was about 10 to 12 miles. In England I should judge it to be considerably less, but large bodies of troops ought to be visible on clear days at a distance of 7 or 8 miles. Lastly, I have to answer the question "whether we are not cutting down the weights too much, and trying to make the balloon equipment too light." I agree that it would perhaps be better to have a larger balloon because it has more buoyancy with which to fight against the action of the wind, and I think it is only a question of time; an improved pattern of a lighter tube will provide a means of carrying gas for a larger balloon without increasing the weight. I do not consider that a portable generator is as good as the tube system. To begin with, I have already mentioned in my lecture, the gas takes a long time to make, and the various operations of cooling, washing, and purifying the gas require a large quantity of water which might not always be available. When the tubes are empty, they have to be sent back to the base to be again loaded, but materials for making the gas on the spot have to be sent up from the base in a similar manner, and the acid is very difficult to convey. Referring to the beginning of my lecture, in which I have taken 17,000 cubic feet of gas as the standard of comparison, the weight of the tubes is  $4\frac{1}{2}$  tons, that of the material for the zinc process  $2\frac{1}{2}$  tons, and for the iron process  $4\frac{1}{2}$  tons, so that there is not much difference in the weight that has to be sent from the base to the front. With the tube system there is no other weight to be transported to the front, but in the second system, the generator and other apparatus must be carried.

The CHAIRMAN: This is practically a new subject, and there can be no greater advantage than to ventilate a subject of this sort that is full of potentialities, most of which are perhaps scarcely thought out, in the theatre of this Institution. I had hoped that the gallant Admiral I see opposite me would have told us something about the possibility of using balloons from ships. I know it is held by some people, that for purposes of watching blockading vessels, and that sort of thing, balloons will be found very useful, and that with their field of vision it will be much easier to pick up a ship at sea than pick up troops amongst the lanes and roads of a woody country. However that may be, I hope that the idea which Major Watson suggested will not be lost sight of, namely, that every man who is practised in going up in balloons should be not only a skilled observer from a captive balloon, but should be a trained aeronaut, and able to take a journey independently, when the balloon is not held captive by a rope. I hope, therefore, that our balloon section will not only practise with hydrogen gas, but will also have larger balloons, and practise cruising about the country. I am sure that in that way, and that way alone, shall we be able to get men who are properly trained and who have sufficient experience and nerve. I now have to ask you to thank Mr. Jones for his very interesting lecture.





Friday, February 12, 1892.

ADMIRAL SIR J. E. COMMERE<sup>L</sup>LL, *¶C.*, G.C.B., in the Chair.

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### THE TRAINING OF OUR SEAMEN.

By Vice-Admiral the Honourable Sir EDMUND R. FREMANTLE,  
K.C.B., C.M.G.

"THE training of our seamen" is my theme, and, if I may judge by the lectures which have been given here, as well as by recent articles in the "United Service Magazine," from the pen of Officers of distinction, it is a subject of very general interest at the present time, when a change, which has been in progress for the last fifty years in the Fleet, by the substitution of steamers for sailing ships, is approaching its inevitable conclusion; our men-of-war being now all but universally mastless and sailless steamers, dependent upon machinery alone for their means of locomotion.

The present importance of the subject is, then, my reason for taking it up, and not because I have any fad or hobby of my own; it is probable that I can say little that is new, but I trust that I may say much that is true, and which will be acknowledged as such by my brother Officers. In my view, the principal writers and lecturers who have dealt with the training of our seamen have lived far too much in the region of sentiment, and have seldom condescended to look facts in the face, so that their contributions, however interesting, have had a reactionary tendency, and this, I think, is unfortunate. But I propose dealing with the views of others more fully later; it is more to the purpose at present to explain my own standpoint, which is simply that, while I yield to none in my respect and reverence for our old naval heroes—and the conditions under which they developed their seamanlike skill are an interesting study—I consider that the path of wisdom is rather to look forward than backward, that there is neither manliness nor profit to be gained by "crying over spilt milk," and recognizing that "The old order changeth, yielding place to new," it is our duty to endeavour, in the training of our seamen, to adapt them to their environment.

Intimately connected with the subject of training is that of numbers and organization.

It is obvious, for instance, that, if we require more boys or men in future, the system of entry and training must be altered or modified, while the question of the organization of our ships' com-

panies is, to a great extent, the further training of our men-of-war's men after they have left the training ships, and cannot, therefore, be overlooked; my subject, accordingly, divides itself into three heads:—

- I. Numbers required for peace and war service.
- II. Organization.
- III. Early training.

The latter is, of course, the important point, and the one with which I propose specially to deal; but for the reasons given above it cannot be dissociated from the other two, on which it, in great part, depends; if, however, it is objected that my proposals with regard to numbers and organization are somewhat sketchy, it should be remembered that I am only dealing with them incidentally, and as a frame to my views on training.

Let us now look into the question of our available personnel. Have we an active and reserve force sufficient to enable us to man all our ships, mercantile auxiliaries included, in case of a maritime war? Shall we be able to do so in 1894, when the ships to be provided under the Naval Defence Act are completed?

Before answering this question I should like to say that I am no alarmist, and that my theory always has been, and is still, that the modern man-of-war being a complicated machine, highly trained Officers and men are absolutely necessary, so that I should aim at having our first line thoroughly efficient, and that I should consider a large and generally inefficient reserve to be neither necessary nor desirable.

Given, I thought, a war well begun by ships properly manned and disciplined, and as the war proceeded the gaps would be filled by volunteers from the merchant service and men with a predilection for a sea life, and I called to mind how our Navy had increased in the great French war from a total of 45,000<sup>1</sup> men in 1793 to 140,000<sup>1</sup> in the later years of the war, and how, in more recent times, the American Navy, which had only numbered 7,600<sup>2</sup> in 1861, with 1,457 Officers of all grades, in 1865 numbered 51,500 seamen with 7,600<sup>3</sup> Officers, curiously enough the exact number of the seamen four years previously.

These considerations are consolatory, but there is the reverse of the medal. The seamen-gunners and torpedoists we now require cannot be recruited from the mercantile marine, as seamen could formerly, and the Americans had no navy to oppose them, whilst other maritime nations have now much better organized reserves than they had 100 years ago, so that I propose to shortly examine the numbers composing our present force, reserves included, and to see whether there are reasonable grounds for considering it insufficient.

This is not the place for going into details, especially with regard to Officers; but, lest it should be supposed that I have overlooked

<sup>1</sup> James, "Naval History," vols. i and vi.

<sup>2</sup> Professor Soley, in "Battles and Leaders of the Civil War."

<sup>3</sup> Admiral Porter, "History of American Civil War."

this part of the question, I say at once that I do not share the views of those who complain bitterly of the dearth of Lieutenants, even advocating a large increase of their numbers with a corresponding addition to the half-pay list, my reasons being that it is most important that all our Officers on the active list should be kept efficient by constant service; that no other Power has any such reserve of naval Officers—France especially having but a bare sufficiency for peace service; and that we have in the Officers of the Royal Naval Reserve a most useful body of men, numbering, according to Mr. Forwood, “758<sup>1</sup> in 1891, 86 of whom had served, or were serving, their twelve months in men-of-war.”

In my view, the first demand of a great naval war would be for younger and more active Officers, and I would point out that in the American Civil War one of the first steps taken by Congress was to retire many of the older Officers and to pass a law by which “Commanders became Admirals by a single step, and junior Officers became First Lieutenants of ships in which they were serving as Midshipmen.”<sup>2</sup>

Leaving the Officers, then, let us turn to the men, and let us look at the numbers in the Estimates for 1891–92.

These Estimates show an active force of 71,000 Officers and men, of whom, in round numbers, 2,000 are pensioners or borne for shore service, 4,000 are Coastguard, 14,000 are Marines, 7,000 are boys, 4,000 Officers, and the remainder, or less than 40,000, are petty officers and seamen, under which heading stokers are included.

If we continue our investigations to the next page we shall find our Reserves stated at 26,568, of whom, in round numbers, 21,500 belong to the Royal Naval Reserve, 845 being Officers, 3,000 are seamen and marine pensioners, and 2,000 are Royal Naval Artillery Volunteers, making, with the 71,000 of the active force, a respectable total of 97,548; but from this must be deducted the 2,000 Royal Naval Artillery Volunteers, whom the Admiralty have handed over to the Army, the country being unable to find a place for them among its naval defenders! Making this deduction, we have, in round numbers, a total of 95,500, while France has, according to our veteran Admiral of the Fleet Sir Thomas Symonds, even deducting the *Infanterie de Marine*, a total of nearly 158,000. But this is not all. Our present Royal Naval Reserve has never been called out, and both its available numbers and the individual value of the seamen of which it is composed, as men-of-war's men, are somewhat problematical.

I am myself a believer in the Royal Naval Reserve—that is, I think better of them than most naval Officers—though I consider that they would prove of most value when serving in the mercantile cruisers, which are the ships that many of them would be familiar with; but two facts must always be remembered in connection with the Royal Naval Reserve. The first is, that the number of stokers or firemen in the force is infinitesimal, and the second is, that, practically, we cannot

<sup>1</sup> Mr. Forwood, speech at Liverpool, in “Times,” 13th January, 1892; the Estimates give the number as 845.

<sup>2</sup> Professor Soley, “The Blockade and the Cruisers.”

increase their number beyond that at which it stands at present. Mr. Forwood,<sup>1</sup> indeed, estimates that it might be increased by 10,000 men; but in the same speech he tells us that, in spite of three-quarters of a million increase in the tonnage of the British mercantile marine in the last fifteen years, the number of British seamen has diminished by 20,000. Practically, then, our only reserve is of doubtful value, and cannot be increased, while we have no reserve at all of stokers.

In our active force, Vote A, we have, it is true, our 4,000 Coast-guard, the Marines on shore, and men in harbour and gunnery ships, but these would certainly not be more than sufficient to man all our available ships, even at the present time, and in 1894 we should be unable to do so, though the Admiralty are preparing, to some extent, to meet the difficulty by increasing the entries of boys. No doubt some of the Royal Naval Reserve would be available, though I omit them from my calculation for the reasons above given.

We are then forced to the conclusion that our present system does not give us a force large enough for our requirements, and that, admirable as it is in many ways, some change is necessary. This is the universal opinion of naval Officers; the quality of our present active force is admirable, but it is inexpansive; its quantity is insufficient, and our reserves are inadequate.

Sir Thomas Symonds,<sup>2</sup> in a recent letter to the "Times," speaks strongly on the point, quoting the opinions of Lord Alcester, Admiral de Horsey, Sir A. Ryder, and Sir A. Phillimore in support of his views. It is true that these opinions were given in 1884, but, if they were correct then, they are, *a fortiori*, held now that the matériel of our Navy has been so greatly increased.

Admiral of the Fleet Sir Geoffrey Hornby is still more explicit on the same subject, his second article on "The War Training of the Navy," in the September number of the "United Service Magazine," last year, beginning with the following words:—

"In view of the considerable increase of matériel that the Fleet will receive two years hence, and the large additions that will assuredly be required so long as the activity of the mercantile marine continues to increase at its present rate, it may be well to consider how the personnel to man and form a reserve for that fleet is gathered and trained.

"The mercantile marine can give good Officers for such a reserve, but it can no longer give the goodly supply of seamen that constituted the naval strength of the country so long as the Navigation Laws were in force."

"The 34,400<sup>3</sup> petty officers and seamen of the Navy and the 24,500 that are promised on paper from the Coastguard and Royal Naval Reserve are small numbers wherewith to meet the waste that a war must cause." Further, the Admiral of the Fleet says that our petty officers and seamen of that reserve, "though good individually, are destitute of organization."

<sup>1</sup> Speech at Liverpool, "Times," 13th January.

<sup>2</sup> "Times," December 31, 1891.

<sup>3</sup> The Admiral does not include the stokers.

I have quoted Sir Geoffrey at some length, as his opinions naturally carry great weight; his proposal for a reserve is "to train young men in large numbers, so that when thoroughly disciplined they may overflow into the mercantile service as reserve men, bound for a certain period."

The consideration of his proposals will follow more naturally later, but it is clear that in his view the present system fails to give us the numbers we require, and that he is dissatisfied with both the quantity and quality of our reserves. That this opinion is shared by the Admiralty to some extent is shown by the Manning Committee recently formed, and by the remarks of Mr. Forwood, previously referred to.

My proposals are as follows:—Seamen boys to be entered as at present, but to serve only for seven years in seagoing ships, from the age of eighteen.

Stoker boys to be entered at the age of seventeen at the barracks, for one year's training in gunnery drills, gymnastics, boat sailing, pulling, and a preliminary course of stoking. To serve for seven years, from the age of eighteen, similarly to the seamen boys.

Both classes to have the option as far as possible of joining either—

(a.) Coastguard and Harbour Defence Force.

(b.) The Royal Naval Reserve.

My idea would be to develop a harbour defence force to man harbour defence vessels, gunboats, and torpedo-boats, some of which should be stationed at various ports round the coast, as the French are doing. As the Admiralty have decided that the defence of the naval arsenals is to be entirely in military hands, the harbour defence force for Portsmouth, Plymouth, &c., would be under the orders of the General, though its discipline would of course be under the Admiralty. I confess that from this point of view especially it appears to me that it would be of advantage if the garrisons of the seaport towns were mainly naval, and under the naval Commander-in-Chief.

I have stated that I should like to give the men their choice of the Coastguard and Harbour Defence Force, or the Royal Naval Reserve, but it would probably be advisable to limit the former to 10,000, and if there were too many volunteers, the Admiralty would of course select the best men. Men choosing the Coastguard and Harbour Defence Force to serve for a further period of seven years, at the expiration of which time either to stay in the Coastguard or in the Reserve for eight years, or to be discharged.<sup>1</sup> Men choosing the Reserve to serve for a minimum of five years, with the option of continuing in the Reserve until the age of forty.

<sup>1</sup> From the remarks of several of the speakers in the subsequent debate, it appears that my meaning was not clearly expressed. I intended that each boy on joining should serve for a minimum of twelve years, from the age of eighteen, as at present, seven under the pennant and five in the Reserve, but, if after the seven years at sea he elected to join the Coastguard and Harbour Defence Force, he was to re-engage for seven years, or a total of fourteen years from the age of eighteen.

Scale of pay, drills, &c., for the new Reserve to be assimilated to that of present Royal Naval Reserve, which I should propose to call the Royal Naval Mercantile Reserve.

Pension to be much as at present to those completing time in Coastguard, and graduated for those completing all their time, either partially in the Coastguard and partially in the Reserve, or wholly in the latter.

A selected number of young men, not exceeding 10 per cent., promising to make good petty officers, gunnery instructors, or warrant officers, to be allowed to volunteer for a second seven years in the Fleet, and to complete time for pension if of good character, or to be allowed to join the Reserve to complete their time; if doing the latter, pension to be equivalent to those completing time after the first seven years in the Coastguard.

The Marines to remain at about their present strength, 14,000.

In order to carry out this system, it would probably be necessary to increase materially the entry of boys, and to raise the number from 7,000 to 10,000 under training. I have no data on which to calculate the number of boys which would require to be entered to be trained as stokers. On the one hand, we have at present a very few stokers in the Coastguard, and practically none in the present Royal Naval Reserve. On the other hand, with the system of boy entry I propose, and even with the entry and training in gunnery as now carried out, the waste will become less, whilst in the industrial employments of the country stokers are plentiful, and a stoker requires a less period of training than a seaman. I should say, therefore, that to increase the number of boys entered for stokers by one half more than the present entries would be sufficient to supply the waste, and allow of a certain number overflowing into the Coastguard or the Reserve.

It is evident that if these proposals were adopted we should have too many seamen and stokers in the barracks, and it is essential that our seamen—and as I now call them I refer to the whole number so called in the Estimates, which includes stokers—should have as much experience at sea as possible. How is this to be done? My suggestion would be to withdraw the Marines from seagoing ships, and, if necessary, from the First Reserve (Coastguard) ships, filling their places with seamen, boys, and stokers; the latter would form a fourth watch, as suggested by Mr. Harry Williams, Chief Inspector of Machinery, thus allowing each watch of stokers to work on deck alternately.

As there are over 4,000 marines now in seagoing ships, and 2,500 more afloat, we should thus have a fair margin, enabling us to give our seamen and stokers as much sea experience as at present. The Marines would still assist to man the purely harbour defence vessels and the mobilized ships, the Admiralty regulating from time to time the number, if any, to be employed in the Coastguard ships. It might be advisable to leave a small detachment in each ship for marine servants and special sentries.

These proposals are of course open to objection. I shall be told

that I am withdrawing the Marines from the sea, and generally substituting younger and less perfectly trained ships' companies than we have at present, but I would answer that if we are to have a reserve some sacrifices are necessary, that our crews will even then be composed of more experienced men than those of the French, German, Italian, Russian, or, I believe, any foreign Navy, while it is evident that service afloat is more necessary for the seaman and stoker than for the marine. I would also point out to any of my sailor critics who are so strongly in favour of masts and sails as necessary to ensure smartness that, if more training and drills are required for our younger crews, it will serve to keep up their interest in their work, and to smarten them up generally.

I have not attempted to estimate the expense of these changes. There would doubtless be some considerable increase in the expense of the training service, and larger reserves must cost more money, but, if efficiency is the result, this is practically of no consequence. My contention is that we urgently require a reserve, and, if so, we must pay for it. I would point out, however, that our present system practically gives us no reserve, while at the same time the pension list for seamen and Marines has been increasing of late years at the rate of 12,000*l.* to 15,000*l.* yearly. The pension list would of course decrease in future years, should my suggestions be adopted.

My principal aim and object has been to form a reliable Naval Reserve; it is true that, though a commencement would be made at once by allowing men of more than seven years' service to go into the Reserve, little effect would be produced for some years, but even ten years hence the Reserves would probably amount to 5,000 or 6,000; and I should hope that in fifteen to twenty years the Coastguard and Harbour Defence Force would number 10,000 instead of the 4,000 present Coastguard, while the new Royal Naval Reserve should be double that number. This Reserve would, of course, be in addition to the Mercantile Royal Naval Reserve, with which I do not propose to interfere, and with a Reserve force of 30,000 men-of-war's men and a total naval strength of personnel of more than 120,000 men we should, I consider, be amply provided with men at the outbreak of war.

It may be asked, "Why is it necessary that we should make such changes and sacrifices now, we have done well enough without them hitherto?" My reply is, "Look around you. We have seen of recent years entire nations in arms, till Europe has been turned into an armed camp. While this feverish activity was confined to armies, we could afford to look on complacently, and, fortunately for us, sailors cannot be so easily improvised or trained, whilst, however numerous the 'inscripts' or naval conscripts of foreign Powers, they were of little use without sea experience and vessels to fight in."

The latter cost money, limiting directly the naval ambitions of our possible enemies, but it is evident that, now that the principal European Powers have reorganized their armies, they are turning their attention to their navies, so that even since our Naval Defence Act was passed, and perhaps partially as a reply to it, France, Italy,



Russia, and Germany have been spending large sums in increasing their naval force, and already it is clear that we must reconsider our naval programme in order to preserve the proud position necessary for us of mistress of the seas.

This, however, is not my theme, but it is evident that our position when the Naval Defence Act was passed is not that of to-day, and that we can no longer rely on a small number of men forming a standing navy with a very limited reserve. Even a war with France alone would strain our present resources, and we have the authority of the First Lord of the Admiralty for the statement that we should aim at nothing less than having a naval force equal to that of any two Powers, say France and Russia.

The above outline of what I should propose for our personnel is, I am conscious, very incomplete, but I am satisfied that it fairly represents the direction in which we must move, and though my subject is the training of our seamen, this must depend in great part on the system of entry and the time spent under the pennant.

Turning, then, to the training of our seamen, the system which I advocate is one which is suitable to boys who will only spend seven years man's time in the Navy as part of the seagoing force, except in the case of specially selected men; but, before going into details on this subject, I propose to deal shortly with the question of organization, which depends closely on our system of entry, and is also intimately connected with early training. Organization, it is evident, must be affected by the time to be served under the pennant, and though this should more logically follow than precede early training, as the latter is the most important point and my immediate subject, I prefer dealing with organization first.

In the article by Sir Geoffrey Hornby,<sup>1</sup> from which I have already quoted, the Admiral of the Fleet advocates a plan for naval regiments or permanent crews, which he believes would be of advantage in making more close and permanent the connection between Officers and men and increasing efficiency through the confidence engendered by long association. It is a fascinating idea, but it would undoubtedly be difficult to carry out, and while it would have some advantages, as the Admiral himself sees, it would be likely to lead to specially favoured regiments.

There are also general objections to the regimental system as regards promotions, which have been a great difficulty in the Army, and there are, it seems to me, other and simpler ways of improving our organization. The Marines, for instance, are an example of *esprit de corps* acting without this stimulus, of which we have all seen examples when detachments from different ships are brigaded together ashore. The Admiral advocates the regimental system so as to obviate the strangeness of Officers and men to each other and to the ship when newly commissioned. This, however, is now being met to some extent by the system of skeleton crews in ships forming the Fleet Reserve, and I should be glad to see this principle carried further by every ship ready for commission having her Captain nominated to her as is

<sup>1</sup> "United Service Magazine," September, 1890.



done in the German Navy, who should be on full pay without command money.

My further suggestions on this point would be that the seamen's barracks should be made as home-like as possible, in this respect following the example of the Marines. I would also reduce all terms of service abroad to two years, as is done by the French and Germans. To attain to some continuity of system and to obviate the great waste of time and efficiency while a new ship's company were hulked abroad at Malta or elsewhere on recommissioning, I should like to avoid recommissioning abroad altogether, but, so long as a ship is fit to continue in commission without a thorough overhaul, I would change Officers and men as their time expires, and keep the ship in commission "as a going concern," to borrow the language of the business world. This is the system at present adopted with the Channel Fleet, and I fail to see why it should not be applicable to all stations. It would necessitate, no doubt, constant drafts going to and from their stations, but this is the case now, and a ship recommissioning abroad usually leaves one-third of her crew on the station as being less than eighteen months from England. I would also advocate the ships being changed from one station to another frequently, as there is no doubt that ships long stationed in unhealthy climates frequently become infected.

It seems to me that the above proposals would have the following advantages :—

- (a.) It would retain ships abroad which are in good condition, thus avoiding the expense of sending them home, or having everything pulled to pieces to satisfy new Officers.
- (b.) We should escape the loss of efficiency when all Officers and men are alike new to their ship.
- (c.) The danger to discipline now incurred while a new ship's company are hulked for months and the ship is having a thorough overhaul would be obviated.
- (d.) Officers and men would be more contented, as the period of service abroad would be shorter, and they would feel secure of not being kept away from England on an unhealthy station for more than  $2\frac{1}{2}$  years at most, instead of any time between 3 and  $4\frac{1}{2}$  years as at present.

In other respects than those I have referred to, our organization appears to me to be satisfactory, and this is, I presume, the view of most naval Officers, as, except Sir Geoffrey Hornby, no change is proposed by those who have written on the subject of the training of our seamen.

I now come to my third head and subject proper, which involves the important point as to the system on which our boys and young seamen should be trained. Is our present plan of boys' training ships, with brigs attached, satisfactory, or in what way should it be modified? Is training in masted ships advisable or necessary in the present state of the Navy? Is a training squadron of masted ships performing evolutions under sail a necessity, should it be increased so as to train more men in old-fashioned seamanship, or, on the other

hand, should it be abolished as an anachronism unsuitable to the requirements of the present day? These are points which have been warmly debated in this theatre, and in the pages of the "United Service Magazine." Sir Geoffrey Hornby<sup>1</sup> has given his high authority in favour of training in sailing ships; while Captains Noel<sup>2</sup> and C. Johnstone<sup>3</sup> have followed suit in urging strenuously the necessity for the retention of masts and sails as a means of training.

Here, then, we have a most experienced Officer of high rank, backed by two talented Captains on the active list, pressing for more old-fashioned seamanship training—and their views must be treated with respect. On the other hand, we have Chief Inspector of Machinery Mr. Harry Williams<sup>4</sup> and Captain FitzGerald<sup>5</sup> apparently (for the latter, as usual with him, writes in a humorously extravagant vein) arguing that seamen and stokers should be interchangeable, and that the stoker-gunner or gunner-stoker is the man of the future.

Now, I wish to approach this subject without prejudice, and, as I began my lecture by saying, I am not aware of having any fad or hobby of my own on the subject, but I claim to look facts clearly in the face, and I decline to be led away by false sentiment to make a move in the wrong direction.

The old question, so often raised and so differently answered, is What is seamanship, and who are seamen? The simple answer should be, in my opinion, that a seaman is a man inured to the sea. It follows as a corollary that he must be an adept at the handicraft necessary to enable him to live on the water. He must accordingly be able to manage his ship or boat or the machine in which he floats.

But ships and boats have varied, and will continue to do so, though, according to the mast-and-sail advocates, it would almost seem as if nothing was a ship which had not masts, and was not propelled by the wind, and no one was a sailor who had not served in such a ship. According to this view, it would mean that sailors have only existed in the last five centuries, and that they are about to perish out of the land. The narrowness of this definition needs only to be stated to be appreciated. In my estimation, those who managed the triremes, and knew how to propel them by oars at the rate of 8 or 9 knots,<sup>6</sup> were sailors of their day, and their glory has departed. Captain Mahan<sup>7</sup> tells us how much discussion there was as to the tactics and management of fire ships in the days when Rupert and Monk fought their bloody actions with De Ruyter and Van Tromp; yet this skill, too, is a lost art. Later, again, there was a time when,<sup>8</sup> "through

<sup>1</sup> "United Service Magazine," August and September, 1890.

<sup>2</sup> "R.U.S.I. Journal," 1889, No. 149.

<sup>3</sup> "R.U.S.I. Journal," July, 1891, No. 161.

<sup>4</sup> "United Service Magazine," June, 1891.

<sup>5</sup> "United Service Magazine," April, 1891.

<sup>6</sup> Dr. Warre's Lecture, "R.U.S.I. Journal," 1876, vol. xx.

<sup>7</sup> "Influence of Sea Power upon History."

<sup>8</sup> Mr. Walter's account of Anson's voyage, when speaking of the accident to the Spanish flagship off the Horn.

the negligence of an Officer of the watch," it was not considered extraordinary that a ship's masts should be rolled over the side; yet Officers of the watch in sailing ships of our days have known no such responsibilities.

Captain Noel,<sup>1</sup> in defining seamanship, says, truly, "It is the science in which our sea fishermen excel, and which makes them the independent and hardy race whom none can fail to admire" . . . "it must be instilled into us in our youth, and can only be instilled by constant sea work—constant battling with the elements;" and then, leaving this firm ground, he goes on to quote Sir Geoffrey Hornby as affirming that this seamanship, which in the premiss has nothing to do with sails, can be learnt "only with the help of the teaching power of sails."

With this view I entirely disagree. Sails are, or rather were, an essential part of seamanship; but seamanship no more depends upon sails and sail power than upon a knowledge of machinery in a steamer. Sails were, in fact, only the machinery of a certain age. The best sailors were always the men of most general knowledge and adaptability, while the inferior men were content to be able to work the systems with which they were familiar.

A short yarn will best illustrate my meaning. Some fifteen years ago, when I commanded a Coastguard ironclad, a chief officer who was in charge on the forecastle, though full of zeal, was unaccountably slack in carrying out orders, and I sent for him, after some difficulty in getting the preventer main-brace manned. His answer to me: "Beg pardon, Sir, but I am not accustomed to these here square riggers," explained the matter. He had served all his time at sea in Coastguard cutters, and was, probably, as good a seaman as we had in the ship.

The subject is an interesting one, and I feel inclined to dwell on it; but I will only state my opinion, that seamanship may and will exist entirely without regard to sails, of which I give the following illustrations:—

It was seamanship which enabled the late Sir William Hall (Nemesis Hall) to bring his frail craft safely to China by "undergirding the ship" in the first China war.

It was seamanship which Captain Kane displayed when he took the "Calliope" safely to sea, in the face of the hurricane at Samoa, which we all remember.

Seamanship was shown in putting together and fitting out the sternwheel gunboats "Herald" and "Mosquito" in the Zambesi by Officers and men of the East Indian squadron in 1890; and Lieutenant Keane (now, I am glad to say, promoted to Commander) has shown the possession of seamanlike qualities in navigating his command safely in the shallow waters of that river, and in keeping his ship in good condition, and his men in fair health, notwithstanding many difficulties about the supply of naval stores and provisions.

This is true, the advocates of sails may say, and fairly satisfactory as regards Officers who, after all, learnt their seamanship in

<sup>1</sup> "The War Training of the Navy," July, 1891, "United Service Magazine."

masted ships; but for the men we want gymnastic exercises aloft to give them self-reliance, activity, nerve, courage. There is something in this argument, but both the Captains to whom I have referred agree that sham drills are of little use, and that there must be real sailing and dependence on sails.

That this is possible now in the Service they cannot show. Captain Noel gravely assures us that the training squadron in which he served had covered a distance of 55,432 miles,<sup>1</sup> of which 32,210 miles, but little more than half, were under sail! He proposes a new training squadron of faster steamers in which the sail power must perforce be a farce.

Captain Johnstone<sup>2</sup> argued in this Institution last year in favour of masted ships on foreign stations, as "in certain cases the peace occupations of the Navy can be performed as well under sail as under steam." This was certainly not my experience in the East Indies, and if it means anything it entails the substitution of slow steamers with good sail power for efficient modern cruisers, a policy which was attempted fifteen years ago, and which has been wisely abandoned by the Admiralty as being discreditable to the naval power of the country, and a source of danger in case of war.

It would almost seem as if these Officers had entered the Service fifty years ago, had then closed their eyes, and like "l'homme à l'oreille cassée" of Edmond About had woke up with horror to find sails discredited, when the fact is they have themselves taken no small part in the gradual change that has taken place. Their arguments would, in my opinion, have been much more apposite had they been given to the naval world fifty years since, when the change was being initiated, than at the present day, when it is nearly completed. The shifts that they are put to, to which I have above referred, shows the weakness of their case; but I should like to speak with more respect of the strong advocacy for the old seamanlike training by Sir Geoffrey Hornby. This is not only on account of his rank and reputation, but because he logically accepts the fact that the old training of a sailor, if it is to be a reality, must be carried out in sailing ships. His proposal is<sup>3</sup> that the Admiralty should build or acquire "small clipper ships of 800 to 1,000 tons," to sail to Australia, refit, and come home again, the crews to consist of 250 to 300 men, 50 of which to be Officers and instructors. "24 of these clipper ships would train 4,400 young seamen" yearly, he tells us. Now this is thorough, and if the old seamanship is to be galvanized into life again, this is the way to do it. But any one can see the objection to such a course: there is the expense, the taking away of 6,000 seamen from the active Fleet and placing them in non-fighting ships, where they would be in danger of being taken prisoners in case of war; but, besides these obvious objections, whilst they were learning their seamanship, there could be little man-of-war routine, and no gunnery or torpedo instruction, so that I think the gallant

<sup>1</sup> Captain Noel, "R.U.S.I. Journal," 1889, No. 149.

<sup>2</sup> "R.U.S.I. Journal," July, 1891, No. 161.

<sup>3</sup> "United Service Magazine," September, 1890.

proposer must himself see that his suggestion has no chance of being adopted.

To me it appears that such a scheme, even if it cost nothing, would do more harm than good, while from its lack of real preparation for a modern man-of-war's man's duties it would be most unpopular. I wish to speak with all respect of the plan, as something similar occurred to me some years ago, though farther consideration has convinced me of its impracticability, but if so we must resign ourselves to gradually giving up the old seamanship, as it has in fact given us up. This brings me to the masted training squadron. In my view, a cruising squadron is distinctly a good thing, both from a naval and a political point of view, and so long as we have suitable masted ships, I see no harm in its being retained as at present. At the same time, if I have gathered aright the opinion of naval Officers, both those of high rank and junior Officers, as it is worked at present, everything, gunnery, discipline, cleanliness, being sacrificed to sail drill, I consider it a mistake, and I doubt whether we should not do better by following the Germans in forming our training squadron of mastless vessels. I am in no hurry to make such a change—it will come soon enough, and the transition should be as gradual as possible; but I deprecate any attempt to put back the hands of the clock, and I would rather step forward to meet the change which, however unpalatable, is inevitable.

Our Cassandras will reply that, if this is so, our seamen in the future will be very inferior to those of past days. I confess that I fail to see this, and I have some reason for the faith that is in me. The first ship that I went to sea in, in 1849, was the "Queen," a first-rate, Sir W. Parker's flagship in the Mediterranean, a sailing ship, of course, and she had a smart ship's company. Now I picture to myself fifty of the best seamen in the "Queen" as I remember them falling in on the quarter deck, and on the other side fifty of our best men in the "Boadicea," my late flagship in the East Indies, and I try to compare them. First let us look at them as sailors, as Sir G. Hornby, Captains Noel and Johnstone understand the term, and I have little hesitation in saying that the worst of the fifty "Queen's" would probably be a better sailor than the best of the "Boadicea's;" but let us look at them as men-of-war's men, and I have no doubt as to the "Boadicea's" being the best; they would be better trained and disciplined, know their work better, be infinitely superior in intelligence, cleanliness, and discipline, and even in physique.

I do not think that I make any mistake here, and to what is this due? My reply is: to better training, more system, more attention to food and comforts, more education. Can we not, to use Sir Geoffrey Hornby's words, "continue to shape in the same factory where we have approved the manufacture,"<sup>1</sup> and thus arrest the decadence prognosticated?

But while I refuse to take a step backward, there is no reason or

<sup>1</sup> "United Service Magazine," September, 1890. Sir Geoffrey says "first" factory; I have altered the word to "same," as with the context my meaning might not be intelligible.

common sense in making sudden changes as proposed by Mr. Harry Williams and Captain FitzGerald, who may be reminded that there are still sailing ships being built, and that the art of management of vessels and boats under sail is still necessary to any one calling himself a sailor; so that I can scarcely take their proposals seriously that early education should be precisely the same for seamen and stokers. It may be that in time this might be advisable, and we might begin by training boys to be "all-round men" as they propose, but even so it would probably be advantageous to differentiate them into seamen and stokers as soon as they went afloat.

This brings me to the question as to whether stokers should be combatants, and I think that, bearing in mind that the following are the proportions of seamen and marines to stokers in our mastless ships, they certainly should all be drilled in gunnery, and all stokers 1st class should be T.M.; they would then, of course, be classed as combatants. It is not necessary here to allude to the question of the Officers.

Name of ship and class.	Exclusive of Officers.				Percentage of non-combatants to combatants. <sup>1</sup>	Total complement.
	Seamen.	Marines.	Total combatants.	Stokers, non-combatants. <sup>1</sup>		
"Admiral" class.						
"Howe".....	227	65	292	126	30	525
Belted cruiser.						
"Immortalité".....	226	72	298	114	27·7	490
"M" class.						
"Medusa".....	75	21	96	87	47·5	219

Having examined various theories, I propose now to sum up our requirements for a modern man-of-war's man. These I should put much as follows:—

- (1.) Habit of a sea life, sea legs, sea stomach, &c.
- (2.) Physique, activity, hardness, power to stand considerable changes of climate and of enduring prolonged spells of exceptionally hard work.
- (3.) Efficiency in boat work, anchor work, and general seamanlike knowledge of the day.

<sup>1</sup> As my original percentages appear to have been misunderstood, I have now given the percentage of stokers (who are now non-combatants, but who might be made combatants) to the whole fighting force—seamen, marines, and stokers—who might take part in an action, say as a landing party, exclusive of Officers. There are, of course, necessarily many more non-combatants, and the table does not profess to give the proportion of non-combatants to combatants generally. The whole complement is given for reference.—E. R. F.

- (4.) Efficiency in gunnery and torpedo work of all descriptions.
- (5.) Education, intelligence, trustworthiness.
- (6.) Alertness, readiness of resource, quickness of decision, in fact, the many qualities which are included in the expressive word "smartness."
- (7.) Knowledge of stoking and work in the engine-room.

Let us now examine our present training system for boys, and see how far it meets these requirements. This is generally acknowledged to be admirable, the present regulations having been drawn up by experienced Officers, and issued by the Admiralty as late as January in last year. They may accordingly be considered quite up to date, and, though very elaborate, are very practical.

I do not propose any material change in the system of training in the training ships except in two particulars, to which I will refer presently; but in view of the number of boys under training, which I propose to increase from 7,000 to 10,000, at least four more training ships are required in addition to the "Caledonia," recently established at Queensferry. They might be placed as follows:—one at Liverpool, one in the Tyne or Humber, one at Greenock, and one in Ireland, either at Belfast or Kingstown. This is absolutely necessary, as our present training ships are already overcrowded. The entry regulations and standards appear satisfactory, and they must depend to some extent on supply and demand; the only suggestion which I should make would be that, if possible, the educational standard should be raised from Standard II to Standard IV.

I have no remarks to make as regards school and gunnery except that, as gymnastics form a preliminary to the gunnery courses and that I attach special importance to the gymnastic exercises, if necessary, the time for their being more fully carried out might be taken from the gunnery.

Let us now look at the seamanship instruction of the boys 2nd Class and 1st Class, of which I give the following condensed summary of the Regulations:—

*Seamanship Instruction for 2nd Class Boys.*

First Instruction .....	(1.) Bag and hammock.
	(2.) Parts of the ship.
	(3.) Ships' fittings.
Second Instruction .....	(1.) Boat pulling.
	(2.) Parts and fittings of a boat.
Third Instruction .....	(1.) Bends and hitches.
Fourth Instruction .....	(1.) Monkey topsail.
	(2.) Masts and yards.
	(3.) Standing rigging.
	(4.) Sails.
Fifth Instruction .....	Semaphore, flags, and pennants.
Sixth Instruction .....	(1.) Lead and line.
	(2.) Compass to some extent. Sail- ing cutter instruction.



Seventh Instruction.....	(1.) Knotting and splicing.
	(2.) Blocks.
	(3.) Rope.
Eighth Instruction.....	Compass and helm.
Ninth Instruction.....	Brig model, running rigging, &c.
Tenth Instruction.....	Mat and sennit.
Eleventh Instruction....	Anchor model.
Twelfth Instruction.....	General résumé.

*Seamanship Instruction for 1st Class Boys.*

- (1.) Tailoring, signalling, sailmaking, seamanship.
- (2.) Boat pulling.
- (3.) Boat sailing instruction.
- (4.) *Exercise aloft.*
- (5.) Swimming.
- (6.) Signals for signal boys.
- (7.) Instruction for call boys.

I would remark here that for the 2nd Class boys only two out of twelve instructions, which I have marked in italics, entail going aloft or knowledge of masted ships, and of the seven heads (or five if we omit specialities) into which the instructions of the 1st Class boys are divided, only one entirely and one partially have reference to masts and sails. Even then, if these instructions were omitted altogether, I do not think we need fear that either the instructor or the boys would find their occupation gone.

Sail drill, I may remark, is only carried out during seven months of the year, April to October included, and I doubt whether even this amount will be found advisable at a northern station like Queensferry or Greenock. The principal suggestions which I should make in regard to the above instructions are (1) that preliminary instruction in stoking with pebbles should be substituted for exercise aloft, say every third day, or when the weather was not suitable for work aloft; and (2) that more attention would be paid to gymnastics. The latter is most important, and I am convinced that the greatest advantage to the physique of our boys would be gained by the course being more thorough than it now is. If necessary, I would even give up gunnery to gymnastics, for the time when a youth will receive most benefit from the course is during his boy's training, when he is well fed and has regular hours. I am, I believe, right in saying that, at present, only one gymnastic instructor is allowed to each training ship, and that he is not always very efficient; there should be at least four. A commencement in this direction was made by the Admiralty in 1888, and Lieutenant-Colonel Fox, the Military Inspector of Gymnasia, informs me that he has trained seventy-four men as instructors for the Navy altogether. This is obviously insufficient, as every large mastless ship should have at least two. Lieutenant-Colonel Fox's lecture at Aldershot in December last is well worth reading, and I extract the following from the report in the "Broad

Arrow" of December 19th: "Some of our sports, said the Colonel, have a tendency to develop only one side of the body; in gymnastics they sought to improve both concurrently, to sharpen the soldier, to teach him how to hold and use his weapons, to walk, run, jump, and climb, and keep him up to the mark without growing stale. . . . It would, he believed, develop self-reliance, determination, and courage in the presence of danger, stimulate the spirit of dash and combativeness, and ensure precision in action."

Of the good effect on the physique of the men, Lieutenant-Colonel Fox gave proof in a squad of the 1st Northamptonshire Regiment, "who had been attending the gymnasium forty actual working days. Their average age was 19 years 2 months; average height 5 feet 5½ inches. On commencing the course the average measurements of the men were:—Chest, 32½ inches; forearm, 9¼ inches; upper arm, 10½ inches; weight, 8 stone 13 lbs. They had shown, up to the present time, an average increase of 2½ inches round the chest, ¾ inch in the forearm, ½ inch in the upper arm, and 5 lbs. in weight." With such facts before us, following on systematic gymnastic instruction, I venture to think that we have more than an equal substitute for sail drill and work aloft, physically at any rate, and I should be glad to see the Admiralty direct the regular practice of gymnastics, not only to a much fuller extent in the training ships but also in the Fleet. The fact is, that the value of work aloft has been much exaggerated; there is not much "useful work," in a mechanical sense, done in pulling at a rope on deck, and it is well known that the smart upper yard men were often kept there too long, not unfrequently for an entire commission, by Commanding Officers who were naturally loth to relieve them by others less active and well trained. I know in the "Agincourt," where we were constantly changing men, that I found, on inspection, upper yard men who had held that exalted position, as I must admit with much credit to themselves and to the ship, for four years! But when this was the state of the case it is evident that the beneficial effects of upper yard work aloft must have been confined to a few, and that the many got on as well as they could without it.

Before leaving this question of training ships, it has been pointed out to me that the seamanship taught is of too old-fashioned a nature, and I would suggest its being modernized to suit our present requirements, rigging being simplified and splicing wire rope being taught, for instance.

A question intimately connected with training is that of the training brigs, and one is reluctant to touch that palladium of old-world seamanship, for they make such a pretty feature on a bright summer's day as they go in and out of Plymouth Sound "in flashing bravery," their white sails contrasting with the deep green of Mount Edgecumbe. But alas! the poetry of the Navy has departed, and, from a sober, common sense point of view, I feel bound to condemn the training brigs. If our object is to make old-fashioned sailors there is nothing to find fault with in the present arrangements; the sailor must be taught to depend on his sails, and there is no more to

be said; but this teaching is unnecessary now, and it must be remembered that the boys seldom spend more than six weeks at most in the brigs, on which the instructions remark, "that merely working the brig, though excellent practice for the Officers and necessary for the safety of the vessel, is of little use by way of instruction."

The use of the brigs is to accustom boys to the sea, to give them sea legs and sea stomachs, and some idea of life in a man-of-war. It is of little use from a purely seamanship point of view we have just seen, and the brigs are certainly primarily intended to teach the boys, and not the Officers who may happen to be serving in them. My contention is that the old-fashioned seamanship which is learnt in the brigs is of little value; they are very cramped, so that few boys can be embarked at a time, and frequently bad weather forces them to take shelter if at sea, or to remain in port if in harbour. At Queensferry, for instance, I think difficulty will often be found in entering or leaving the firth, so that cruising in a sailing brig connected with the "Caledonia" will be unsatisfactory.

In my view as much sea work as possible is essential, but that there are many objections to a sailing vessel, to which I have alluded. I suggest, therefore, that the present sailing brigs should be replaced by small-powered steamers, with plenty of sail power and good accommodation, such as the "Penguin" class. These vessels could accommodate more boys, could go out and keep the sea more regularly than the brigs, and be more efficient generally. I would have only three or four in the engine-room complement, as the boys should be taught to work the engines and learn stoking, thus following the training now instructed to be carried out by the junior executive Officers. From this point of view, I should myself prefer the "Kingfisher," which is now being sent to the Mediterranean to relieve the "Cruizer," having her engines left in her, and to be worked similarly.

I have now finished with the boys, but we must follow them somewhat into sea-going ships before I close my lecture. In the first part, under the heading of Organization, I advocated shorter commissions as tending to greater comfort and efficiency. Routines are a large subject on which I can only touch lightly, but I think some improvements could be made on the present meal hours if the dietary were also amended to allow of a good evening meal. On board mastless ships, of which our modern Navy now generally consists, it is most important that anything and everything which tends to keep our men cheery and lively should be encouraged. Gunnery, torpedo, and other drills should of course be made as smart as possible, boat sailing, boat racing, rifle shooting should all be looked upon favourably by Commanding Officers. Our men should retain their sailor-like smartness under the new conditions. Whether it is hands or watch fall in, the sea-boat's crew, manning a boat in harbour, watertight doors, or anchor work, if the work is smartly done, generally against time, as Admiral Colomb remarked, the best part of a sailor's education will be maintained, and they will remain as distinct from soldiers as—well, as they are now. I would also advocate generally

more frequent and shorter leaves, while every opportunity should be taken of giving the men recreation ashore, and joining in such games as cricket and football. Even in tropical and unhealthy climates day leave should always be given. Consuls and other officials are too apt to consider our men as untamed animals who are sure to get into trouble, and when there would be no idea in certain ports under the British flag of confining soldiers to barracks, it is a common custom to request that no leave should be given to seamen. This is, I think, unfair to our men, and it has a tendency to make them think that they are expected to be uproarious, and to act accordingly. Another question intimately connected with comfort is that of the canteen. Though very general, at present no place is allotted for it, and, accordingly, whether there is one or not is at the option of the Captain. There should always be a dry canteen, I think, though the Captain should have power to close it temporarily in case of irregularities. The present system of distributing the boys in the men's messes is not a good one, and with the larger number we should have in each ship they ought to be in separate messes, under a good 2nd class petty officer.

I have not hitherto alluded to the ratings of our men, and there might be much to be said on that subject, but I have no space in this lecture to touch on it beyond this, that I have a strong opinion that much that is optional in the matter of gunnery and torpedo is a mistake; every man-of-war's man should *ipso facto* be a seaman gunner, and the A.B. and T.M. should be granted together. From this point of view, I consider that the new arrangements by which every A.B. is sent to a gunnery ship and put through a course of gunnery which lasts a month a distinct advantage, and I am glad to hear that only 10 to 18 per cent. fail to qualify as seamen gunners. It is not popular with the gunnery Lieutenants and instructors, naturally, as they have occasional bad characters to deal with; but it was clearly wrong to allow the gunnery and torpedo-ships to take all the good men and to leave all the worst characters in the receiving ships. Now, however, that we shall have many more seamen gunners, it is evident that some will be rather inferior, and some further differentiation of their qualifications is advisable.

It has been suggested that a rating of captains of the gun 2nd class should be established for this purpose, and these men would be useful to take charge of Q.F. guns, which now form so great and important a part in the armament of our ships.

These are details, but all such details are important.

I have now come to the end, and, if some of my remarks have been somewhat controversial, I claim to have endeavoured to treat this important subject without special bias, and solely with a view to the future efficiency of the Service to which we have the honour to belong, and which is so necessary to England's welfare. In many cases I have borrowed the views of others, for I have been at some pains to get the ideas of other Officers who are interesting themselves in this all-important question, so, while I acknowledge their help, I make little claim to originality. But I claim to have looked at the

subject from a large point of view, having set before me the words of Professor Soley,<sup>1</sup> who has written much on naval subjects, that "the primary object of a navy at all times is to maintain itself in all its branches, matériel, personnel, and organization in the most perfect state that is possible of readiness and efficiency for war."

Before I sit down, I should like to recapitulate the following points on which to elicit discussion and opinion.

- (1.) I consider our present "personnel" to be inadequate, and I propose to establish a Naval Reserve of men-of-war's men by a system of modified short service. Is this necessary or practicable?
- (2.) I object to recommissioning abroad, but I propose commissions abroad to be continuous, as in the Channel Fleet, so long as the ships are in good condition, and that Officers and men should be relieved after two years' service.
- (3.) I propose that boys should go through a short course of stoking in the training ships, and that more attention should be paid to gymnastics.
- (4.) I propose that stoker boys should be entered at seventeen, and trained at the naval barracks for one year, also that all stokers 1st class should be T.M. and combatants.
- (5.) I propose to substitute roomy steamers with good sail power for the present training brigs, all necessary stoking to be done by the seamen boys.

Admiral Long: The subject, which we are so much indebted to Admiral Fremantle for bringing before us, is, as he says, one of great importance. I need not say anything about the aspect of affairs abroad after what the gallant Admiral has said in his lecture. If we look at home we see the question of the hour is "free education" and "provision for the aged." Now I think that bears on the subject in this way. It shows that our statesmen and our electors are convinced that the sound training of the individual citizen is absolutely necessary to the health of the body politic. There is no exaggeration in saying that the maritime power of England is the right arm of the British Empire. If that power be suffered to decay from any cause whatever, the British Empire, such as we have known it, will cease to exist. If that be agreed upon, I think we must all acknowledge that no more important subject for our statesmen and our sailors could be brought before us. I have endeavoured to get at some facts as to the numbers of our merchant seamen, but, I regret to say, some of the volumes being missing, I have been unable to get a comparative statement of the number of seamen that were in this country available in 1841 and those in 1881; those abroad in foreign-going ships in 1841 were 138,156, the corresponding number in 1881 being 130,587 from the United Kingdom.<sup>2</sup> The Navigation Laws having been done away with, it is obvious that those who govern the country should see that a proper provision of seamen is maintained. Then we come to the proposal made in this paper for enlarging the Navy. We are told by the First Lord of the Admiralty that our Navy is to be of sufficient strength to enable us to hold our own against two foreign Powers. We can also see by what is published in various directions that the naval war of the future will probably commence very suddenly, and that very severe blows will be

<sup>1</sup> "The Blockade and the Cruisers."

<sup>2</sup> From Census Papers.

struck almost immediately. Now I think that is a most important point in considering this subject. We have heard about the great expansion of the Fleet of the United States and our own in past times, but we cannot, I am afraid, derive much consolation from that, because at the present day, this country not being an aggressive country, it is exceedingly unlikely that it will strike the first blow. What we have to look to is that some one else will strike a blow at us very hard, and we must be prepared for that. I think, therefore, what the lecturer states here, that we should consider that "our first line should be thoroughly efficient, and that a large and generally inefficient Reserve is neither necessary nor desirable," is a very important statement. Now we come to the proposal for enlarging the Navy. The first point that the lecturer places before us is that he considers our present personnel to be inadequate, and proposes "to establish a Naval Reserve of men-of-war's men by a system of modified short service. Is this necessary or practicable?" I think there is no doubt that an extension of the personnel of the Navy is necessary; that it will be practicable I have no doubt. Our statesmen will see to it. But the principal proposal that is put forward here, if it is meant to apply to the whole Service—I am not quite certain whether it is—is one to which I can hardly give my adhesion, seeing that it would substitute a shorter period of service for that which is already in force.

Admiral FREMANTLE: It is for the whole Service.

Admiral LONG: There is an entirely new force mentioned here, the "Harbour Defence" force. I am not quite aware what it means, but I think, as I cannot agree with shortening the period of service, it behoves me to try and propose an alternative. I think we shall have to face this fact, that we must enlarge the Navy. In this matter there is some solid ground of which we can all be certain, and that has been alluded to by the lecturer very strongly. That solid ground is that people who are to be seamen must have as large experience at sea as possible. That is a most important point. If we are to have a Navy the men must have experience at sea, or they will not be efficient. This proposal involves the withdrawal of a certain number of men, and the substitution for them of the same number of other men. I am afraid we cannot say that we shall be so much the better for that. We should not have any more men at sea, and what we want is more men at sea. It seems to me the whole pension scheme might be very well looked into. We throw away our people prematurely. You tell a man at the age of forty, when he is most highly efficient and one of the best men, perhaps, we have in the country, "Good bye, there is 35*l.* a year for you; we shall only call you out when war breaks out." At the same time we are to pay other people for defending the ports. It seems to me that these men would be the very men you want for defending the ports. I do not know that it will be unpopular with them, but, of course, that is the question.

Admiral LINDSAY BRINE: It was arranged that they should do that when they were pensioned.

Admiral LONG: I am very ignorant on the subject, I confess. Then there is the question of the Royal Naval Reserve. Before I came here, I was looking up a discussion that occurred some sixteen years ago, and there were some very interesting remarks by the late Admiral John Crawford Wilson on that subject. He said that in order to provide an increased force you must enter about one-third the number of boys every year.

Admiral FREMANTLE: One third more?

Admiral LONG: If you wished to enlarge the force by 10,000 men, you would have to enter about 3,000 boys every year to maintain that number. He also said, like Sir Geoffrey Hornby, that, owing to the Navigation Laws being abolished, the merchant service is no longer a training ground for the Navy, but the Navy might advantageously become a training ground for the merchant service. Of course, for anything of that kind to be carried out practically, it will require the consent of the ship-owners. I know nothing about what they would think about it. Admiral Wilson said that he considered one year was as much as it was desirable to train a boy in a training ship. He said we should train about 3,000 boys per annum one year, then turn them into merchantmen, and let them take their chance, and you would then gather out of the merchant service, when you wanted them, such men as were fitted for your purpose. That was his proposal, similar



in principle to Sir Geoffrey Hornby's, hence worthy of careful attention.<sup>1</sup> There is another point. I think the complements of all our ships at the present are cut down to the lowest ebb. All of us who have ever been Executive Officers know that when you have men on your sick list, and there always is a sick list, you have not anybody to fill up the vacancies; you are obliged to make one man do two men's work. I do not see why, in all our ships of sufficient size, we should not enlarge our crews, so as to be able to abstract a portion of them when war broke out. The larger crews you have, the more men you have afloat under discipline, the better, I believe, for the Service. Then, considering the very arduous nature of the naval service, and the great portion of it which has to be passed abroad, it would be very advantageous if it were an understood thing that people would be employed on foreign service for the first part of their time, and for the last part of their time would be employed nearer home. In the first place they would be the better men during the last part of the time, and they would form a strong element to depend upon in the case of war—a most important point. It would also suit the men better, for, after being fourteen years at sea, they might be married, and they would prefer to be in England. I think something might be done in that way, and by the aid of a progressive pay, to make the Service much more popular. I am told a great many men are taking their discharge at the end of ten years. They do not get any pension: they go into civil employment, where the pay is better. There is one thing the gallant Admiral says about shortening the period of foreign service, and I think that is very important. When we consider how important our men are to us, we must remember that keeping men for a long time in very hot tropical climates is undoubtedly a very bad thing. This fact has been recognized on the West Coast of Africa, and I think perhaps it might receive further recognition; for instance, upon the West Coast of Mexico, and such places, if people are kept there for a long time, they are very apt to feel it in after years. It takes it out of them. Then I come to recommissioning abroad. I am not sure, as far as my opinion goes, that I should ever recommission abroad. I think ships are just as available, whether on the passage home or out, and I do not see why the ships should not come home. One of the things I have heard as a reason for not doing that seems an exceedingly weak one. I am told that after the ship comes home they will pull everything out of her, but I do not see why they should be allowed to do that.

Admiral FREMANTLE: I did not propose to recommission abroad. I say never recommission abroad. Keep the ship back.

Admiral LOXE: Yes. I understand that Admiral Fremantle then proposes that boys should go through a short course of stoking in the training ships, and that more attention should be paid to gymnastics. In that matter I should go heartily with the lecturer. He then proposes that stoker boys should be entered at seventeen, and trained at the naval barracks for one year; also that all stokers 1st class should be T.M. and combatants. I think that proposal also would carry my entire assent. Last year when I was out with the squadron, I noticed that a great many of the stokers were practically boys, entirely undeveloped, and very inexperienced, and had that squadron, as might happen some day or other, been called out for actual war, those boys would not have had sufficient stamina to stand the work. They could not do it. The work would be very arduous. It behoves us to take care that our stokers are men, at all events, well grown, strong, and capable for their work, and that table certainly shows that they should be combatants. If we look at a ship as she is in action, there are only three things going on on board. First, there are the men who are stoking; secondly, there are the men who are handing up ammunition; and, thirdly, there are those who are firing. Those are the three things we want to pay most attention to. The lecturer then proposes "to substitute roomy steamers with good sailing power for the present training brigs, all necessary stoking to be done by seamen boys." I should agree with that. I think when we look at sailing vessels compared with the fast steamers of the present day, as I have said before here, it appears to me

<sup>1</sup> See lecture by Captain J. C. Wilson, July 2, 1875, and discussion on Lord Brassey's paper of February 18, 1876.



that the motion of a sailing vessel is so different to the motion of a fast steamer that we can hardly say that a man who has been brought up entirely in a training ship would be thoroughly efficient in a steamer. The other day the Comptroller of the Navy went out to Malta, and it was remarked how many of the temporary crew from the "Aurora" were sea sick. I do not wonder at all at that, because I myself, although I have spent a great deal of time at sea, though I have been round the Horn in the roughest weather, still if I got into one of those steamboats that go dashing against a head sea, I cannot say that I, too, should not suffer. I think the main requirement of the Service is that the men should have as much sea experience as possible, that you should keep the men at sea, and have plenty of them, also that service during peace should be regarded as training for war, all men having their turn at each duty.

Admiral BOWDEN-SMITH: It appears to me that the most important part of the interesting paper we have just heard read by Sir Edmund Fremantle is that portion of it which he devotes to the entry and the time served by our men. I understand the reason for wishing to make the proposed changes is to create a greater Reserve; he thinks that by making the changes he proposes we shall get a larger number of men in time of war. Of course it must be obvious to all of us that our Reserve is at present very small. Other nations are increasing their navies, and I noticed in the "Times" of yesterday Vice-Admiral Hollman, of the German Navy, in introducing the Budget, referred to this question, and proposes to increase the personnel. If I do not go quite with Admiral Fremantle in what he proposes, it is probably because I have not given the question so much consideration as he has. I understand his proposal is in future that both the seamen boys and the boys who enter as stokers shall be entered for seven years only, instead of twelve, as at present, and I would like to ask him what the result would be, supposing at the end of seven years those men decided to leave us altogether; we should neither have a Reserve nor the real thing. And, I think, many of those men would leave us: they would be twenty-five years of age, they will probably not be quite settled down to a seaman's life, they will have visited perhaps American and Australian ports, where they will see high wages being earned, and get ideas into their heads that they might do better, and we should lose them altogether.

Admiral FREMANTLE: I do not propose to let anybody leave the Navy; he must go into the Reserve five years after the seven years as a minimum.

Admiral BOWDEN-SMITH: Then I did not quite understand the gallant Admiral aright. I thought the proposal was that we were to engage the boys at the age of eighteen, and they were to serve seven years.

Admiral FREMANTLE: As a minimum the men must serve seven years, and then go into the Reserve for five years.

Admiral BOWDEN-SMITH: I am very glad to hear that is your proposal. That would be twelve years, as at present. With regard to the second part of the proposal as to their volunteering into what is called the home service, I prefer myself to see the men taking their turn in sea-going ships, as at present. With regard to the men who are to enter the Mercantile Marine Reserve for a further period with a minimum of five years, I do not quite see what greater hold you would have over those men than you have over the present Naval Reserve. I presume they can leave at the end of the time, if they wish. I am rather afraid my friend Admiral Fremantle is copying the short-service system of the Army, a system I cannot approve, and, as a citizen and a ratepayer, I would like to say a few words about the soldiers after they have been discharged. I happen to know that in this great city in which we live a large proportion of the unfortunate people who are out of work in our streets are men who have been in the Army, and are now, or have been, Army Reserve men. I do not say this on my own authority only, but on the authority of a committee of experts (voluntary, of course), who state that probably about one-sixth of the able-bodied men who are destitute in London at the present moment are the unfortunate Army Reserve men. I do not wish it to be implied for a moment that I think a man should get anything but good by going into the Army. He ought to be improved by the discipline, and by being subjected to the influence of such Officers and non-commissioned officers as we have in the British Army; but when a man gets out of

regular civil employment in these keen days of competition for seven years, and tries to get back into it, he finds it difficult to get a berth. In the St. James's district, where they estimated that probably one-sixth of the able-bodied destitute men were ex-soldiers, they also remarked that out of the 1,200 people that applied for relief in 1891 there was not one single able-bodied man who had been in the Navy. Our present system is so good, and works so well, and gives such satisfaction, that I should be very sorry to see it interfered with, and we must go in some other direction to establish our Reserve, which doubtless requires to be increased. With regard to the men who leave the Navy before they get their pensions, even those men you see are educated and trained, so that after we have finished with them they remain good and useful citizens, and are able to maintain themselves, and keep off the rates. There are just three other matters the gallant lecturer has mentioned that I should like to refer to, in which I entirely agree with him. The first is the importance of the extension of gymnasiums and gymnastics; secondly, the extension and development of the dry canteen system; and thirdly, the shortening of the period of foreign service. With regard to the gymnasiums, I am quite surprised that more has not been done already. Now that masts and sails are practically abolished, I look upon gymnasiums as quite necessary. They ought to be established at all our naval stations abroad, as well as at home, the Cape, Simon's Bay, Hong Kong, Malta, and such places. The men could use them for recreation when instruction is not going on, and after they are once built they will be little expense to the country; indeed, the only expense would be the gymnasium instructors, and they should be borne on the flag-ship's books, and could, if necessary, take their turn of sea-service. With regard to the dry canteen, I am sorry to gather from the lecturer's remarks that they are not always provided. Accommodation for the canteen is a very great comfort to the men, and I should also like to see all possible games provided for the men when aloft. Anything that makes a man happy or contented on board ship is a good thing. By all means give them plenty of leave. But I think the lecturer will agree with me, that in some places in the East Indies, such as Aden and Trincomalee, for instance, there is hardly anything for the men to do but to go into the liquor shops and drink the vile concoctions specially prepared for their consumption. Then, as to shortening the period of service abroad, I believe that would be a popular and good change. Possibly we could hardly expect the Admiralty to relieve men every two years on such distant stations as China or the Pacific, but three years ought to be the outside, and I think they might even extend the two years system to Flag Officers.

General DUNNE: Admiral Bowden-Smith alluded to my unfortunate Service, with regard to the number of wandering Reservists, and I quite agree in what he said. I often cannot walk from here to my home without meeting three or four old soldiers, but I think Admiral Bowden-Smith is wrong in comparing it with what would be the case if Admiral Fremantle's Reserve was established for the Navy. There are some men who enter the Army without any other means of earning a livelihood, and whilst they are in the Army the profession of arms teaches them nothing which is serviceable to them as citizens afterwards, except a certain amount of discipline, which, I am afraid, is hardly enough inducement for employment. But surely if Admiral Fremantle's plan is carried out for a large Naval Reserve, those Naval Reservists would be quite a different stamp of men, and they would all get employment during the time they were Reservists; for, being educated seamen, there would be always work for them. I do not, therefore, think it would be the same as Admiral Bowden-Smith alluded to with regard to the Army, and I think you must have a large Reserve for the Navy, as we must have one for the Army. At the present time we have 80,000 Reservists for the Army, and you have very few indeed for the Navy. Therefore I think you can hardly compare them one with the other in their present condition.

Admiral FIELD, M.P.: I rise with great diffidence amongst my brother Officers, but some observations that fell from my friends Admiral Long and Admiral Sir Edmund Fremantle, and also from Admiral Bowden-Smith, seem to call for some notice from myself. Admiral Long seems to intimate that statesmen might do a great deal in dealing with some of these questions that have been brought before us. My humble opinion is exactly in accord with his own as to their

power to do good, but I beg to assure him that they have very little initiative as far as my experience goes, and that it is more important that pressure should be brought to bear upon them by discussions in places like this, than that it should be left to the initiative of statesmen in the House of Commons. The members of the House of Commons are our very best friends, and I am certain that no expense that might be recommended by naval Officers of authority—I mean such as I see around me here—would ever be grudged by that House. I have never known a vote ever questioned where any necessity has been shown for any increase of expenditure in my particular department. I remember very well having a discussion with a prominent Radical—Admiral Commerell knows him quite well—before the Naval Estimates came on, one day. I said, “Now we are going to have a naval hornpipe to-night, and I hope you will not interfere with us.” What was his reply? He said, “My dear Field, I would give you another million, anything you want, for the Navy, though you must take it out of the Army.” I had much sympathy with that feeling, though I said I did not join with him quite in desiring to take anything from the Army, but I did desire a large increase of naval expenditure. I beg to assure Admiral Long that you never would have had a Naval Programme at all if it had not been for the pressure brought to bear by distinguished naval Officers outside the House of Commons, as well as by a few modest naval men who are inside it, and by the assistance of the press and public meetings in the city of London. Therefore, if you want anything out of the Government, they are like a ripe orange—you must squeeze them to get the juice out. Discussions in this theatre are of enormous value, because they tend to shape opinion: they tend to enlighten our leaders, and may possibly bear good fruit in the near future. I only rose because I have thought a good deal upon this question, and I challenged more than once our heads in the House of Commons, because I have said, and said last year, it seems to me the question of managing the Navy, when we have got the Naval Programme carried out in its entirety, has never been properly faced by the responsible Admiralty Officers: and all that they have done, and all that they did last year, when the Naval Estimates came on, was to give us a contemptible increase of about 2,000 men and boys, of which, I believe, about 1,000 might be set down to the training ship in the north of Scotland. I have always felt that much more might be done in the way of making preparation to form a Naval Reserve of a superior class, to prevent our seamen, at expiration of their ten years, going away from us. In that respect I have much sympathy with what has fallen from Admiral Fremantle, but I am utterly opposed to his view, and agree with Admiral Bowden-Smith in his objection to shortening the term from ten to seven years. When you are dealing with boys you can do what you like with them; the State makes a bargain with them, or with their parents rather, on their behalf, and you can very well lay down the principle that they shall serve ten years from the age of eighteen, and at the end of ten years, if they do not re-engage, they shall then enter the 1st Class Naval Reserve for another five years, or for as long as you like—that is a mere detail.

Admiral FREMANTLE: I mean seven years afloat, and afterwards another five years.

Admiral FIELD: I have always held that we ought never to allow these valuable men to go altogether, and I have always felt that the payment of 2*d.* extra to these men when they re-engage was a contemptible increase, when you look at what a magnificent man a seaman is at the end of ten years. But we are not considering that so much as whether these men should be engaged to go into our Naval Reserve or re-engage. If you want to create a Naval Reserve of these men, then to raise the pay might be a mistake; but you can do what you like with them when you engage them as boys. I used to be told that the ten-years men, when they did not re-engage, went into the London Fire Brigade. You want to retain them, and to enter them in your first-class Naval Reserve. I am strongly of opinion that the short-service pension which is now allowed by the Regulations, but which he rarely gets, should be a man's inalienable right to demand, if he does wish to re-engage; at the end of ten years from the age of eighteen; I think the short-service pension is little short of a fraud as at present worked: it is never made use of; no man gets it, if he is sound in health and limb. Admiral Long

said he was not aware of the number of *bond fide* seamen in the merchant service. I have looked a good deal into this question, and I understand the number is diminishing year by year; that, two or three years ago, there were not more than 40,000 *bond fide* seamen coming up to the word "seamen" in the merchant service. That is a terrible falling off. I am one of those who have been doing a little in a humble way to try and arouse the authorities in the House of Commons, who ought to be interested in this question, by last year drawing attention to the great waste that is going on in our reformatory and industrial school ships. I would beg, with all respect, to call the gallant lecturer's attention to that point. If we can by any means in our power find a method by which we can do something to repair the terrible waste in the merchant service by infusing new elements of better trained lads into that service than are now received from the shore, we shall be doing good, because the more we can improve the *moral* of the mercantile marine, the better it is for the Imperial Service, inasmuch as we shall be able to draw from it in time of war. I will ask the gallant lecturer to pay a little attention to this subject of the industrial and reformatory school ships of the nation. They are all managed by voluntary committees; but I have found, on examination and inquiry of the Captains of the ships—for they are commanded by naval Officers, and therefore they are entitled to our sympathy—that these ships practically do not do the work they are intended to carry out. Not more than 40 per cent. of the boys in these ships go to sea at all, and the ships are never full. There are, I think, close upon 3,000 boys in course of training on board these thirteen ships. What I say is this, that no boys ought to be allowed to be committed by law at all to any ship; but the ships ought to be manned from the land industrial and reformatory schools; in other words, the ships and the schools should be affiliated together; the ships training the superior class of boys for the mercantile marine received from the land schools. We all know that there are boys who may be eager to go to sea; but when they come on board an industrial school ship, having been committed by the magistrates, anyone can tell, at a glance of the eye, that they will never make sailors: they are poor, weakly lads, picked up from the gutter, real objects of pity. They are often boys who deserve our sympathy: they have committed no real crime, but they have done what many of us have perhaps done in our youth. I am for improving that system, and, having called for a Parliamentary Return for what the result of five years' work has been in all those ships, I find the waste going on is terrible. We have a right to demand that these boys shall be made some use of for Imperial purposes, seeing that the nation pays the larger part of the expense of their training. The private subscribers are scarcely worth mentioning: large annual sums are paid by the Treasury, and it is by those grants chiefly that these ships are maintained: and if more attention were paid to the boys in them, they would form a valuable body, coming forward year after year, and so impregnating the mercantile marine with better material, which would react beneficially upon the Imperial Navy. I came here as a listener. I am always grateful for any information I can pick up in this room, or by any other method, and I do my best to support the policy which is initiated by my brother Officers, who know so much more about these subjects than I can pretend to do. I am only one member out of five who endeavour to do our duty in the House of Commons, and I beg to assure my brother Officers here if they want any good done for the Naval Service these discussions will greatly contribute to the end they have in view. The Government in my humble judgment will never take the initiative in the House of Commons alone, unless it is backed up and driven forwards by naval opinion.

The CHAIRMAN: I think we are hanging upon one point a little too much; I think Admiral Fremantle wished to dwell more upon the education of the boys as we govern them, and the Army as we govern them, than on the plan of getting them.

Admiral LINDESAY BRINE: One word on the question of Reserves. There is a point, I think, perhaps the lecturer did not sufficiently dwell upon in speaking of his scheme of establishing a good Naval Reserve, which is this, that we have established a good Naval Reserve out of our own pensioners from the men who take their pensions at thirty-nine and forty years of age, between that time and the age of

forty-five; these 1st Class Pensioner Reserves are a most valuable body of men; and when a plan was drawn up some years ago, as to the best way of utilizing our Reserves, it was found that between the ages of thirty-nine and forty-five, we had several thousands of first-rate trained men-of-war's men. These men can be either used on board ships, or they can be employed in our ports. I do not think sufficient weight has been given to the importance of seeing that instead of these men being thrown away, as somebody has said, when they get their pension, they really become our most valuable reserves. None of us can quite tell what value to place on our 1st or 2nd Class Mercantile Reserve. They may turn out very good men, but it is possible that in time of war they may in some respects fail. One thing we know, and that is that about 5,000 of our best 1st Class Mercantile Reserve are men many of whom have filled positions as mates of sailing ships, and are always will be ready for service, as they are chiefly employed at our seaports. We are certain of obtaining these men in the event of war, and they are first-rate men. We are also certain of getting about 5,000 good pensioners. Thus it may be expected that we should have 12,000 or 13,000 good seamen immediately available, and we can rely upon them to start with. What will happen after that none of us can say.

The CHAIRMAN: I will just say one word about the question which Admiral Brine has started about the Reserves. The other day we wanted 100 men to take up excessively good positions at Portsmouth in the harbour ships, and out of these 9,000 excellent men between the ages of thirty-eight and forty-five we could not get 100.

Admiral BRINE: They would be obliged to come in case of war. They would not volunteer: they do not want to come, but in case of war they have got to come.

The CHAIRMAN: A volunteer is worth two pressed men.

Admiral COLOMB: Were they to have full pay?

The CHAIRMAN: We offered to engage them for two years and, if they remained for two years, to pay them for their clothes. The question which Sir Edmund Fremantle has raised is, of course we know, impossible to be argued out in an afternoon, but I must say I think we have got to face a fact—it may be a very unpalatable one to a great many of us; it is a very unpalatable one to me—and that is, that as masts and sails have passed away, the training of the men in that line who worked them will have to pass away too. We know very well that in former days we always looked amongst the upper yardsmen for our petty officers and best men; and why was it we looked there? First of all, we always picked out the youngest, smartest, and most promising men to put there. Having put them there, the necessity of going aloft quickly, and of obeying command immediately, made them smart, well-disciplined men. These men on the upper yards have had to look danger and death in the face pretty often, and that has made them self-reliant. I am very much afraid that what Sir Edmund Fremantle says is perfectly true, that some of your very smart Commanders of line-of-battle ships, when they got good men, did not like to part with them. The Commander of the "Queen" says, "No, I am not going to let my upper yardsmen go, because the 'Caledonian' will beat me next exercise day." There is no doubt that was the case, but at the same time I believe and hope it was not general; and if you could look back to the services of our old warrant officers at the present day, you would find that those men had been upper yardsmen, they had done their duty as young men in that position, and they had gained discipline and self-reliance, and have done their duty up to the end. There is one other point I wish particularly to dwell upon and in which I agree with Sir Edmund Fremantle only partially, and that is, I do not think it would be a safe thing, looking at what has happened in the Army, to go even to the fringe of short service. It is not generally known what it costs us to bring up and feed our boys; but, allowing for the waste of those who turn out not worth keeping, and there are a good number of them, it costs over 250*l.* per head. Now, is it wise for us (it is after all a matter of cash) to take and educate a boy to the tune of 250*l.* and then to let him go at the end of seven years? I think you will find the waste in the future will be very great. I have no doubt in the world the Naval Exhibition may bring us good boys at the one end, but I am

quite certain it will put off a number of good ten years' men at the other. Everybody in London seeing that fine body of men, so well disciplined, so well ordered, such sober, fine-looking men, why they would snap at them, and you would find hardly a man who has been up from either Portsmouth or Plymouth, and has taken part in the Naval Exhibition, who is not already suited, when his ten years are up, to a billet. I am very glad for them, but I am very sorry for the Service, because I think we shall lose more than we can spare. Sir Edmund Fremantle is very much pleased with the education of the boys in the training ships. Now, I think he is a little inconsistent about that, and I will tell you the reason why. Look at that list! He tells us you must do away with masts and yards and topsails, and yet he approves of training a boy upon a monkey topsail. What is the good of half those "bends and hitches"? I went on board the "St. Vincent" once or twice at hours when they did not expect visitors, and I saw the number of useless things that they were teaching these boys. I said, "Halloa, what have you got here?" "Oh! we are just teaching the boys to turn in a dead-eye cutter-stay fashion." The cutter-stay fashion was done away with before I entered the Service, and that is fifty years ago. They complain that the time given to education is not sufficient, and yet they are teaching these boys all these obsolete things. I do not think that education satisfactory, and, though it was revised only two years ago, I say tear it up and start a new one. As far as the brigs are concerned, when I was at Portsmouth, the very first application I had was, "Have you any objection to letting one of the tugs tow the brig out of the harbour on Monday morning and tow her into the harbour on Friday night?" I said, "Most decidedly not. If she gets ashore once, the Lieutenants and boys will take jolly good care they don't get ashore a second time. Getting out of and into the harbour is about the best part of the week's work," and I am convinced you will all think that. I will say no more. We have heard a most excellent paper, and if you do not wish to continue the discussion, I am sure we shall be very glad to hear what Sir Edmund has to say in reply.

Sir EDMUND FREMANTLE: Before I answer the various speakers who have taken part in the discussion, I should like to make one or two corrections. I thought perhaps somebody might challenge my statement about the Officer of the watch being afraid of rolling the ship's mast over the side. It sounds rather strange. The fact was I was quoting from memory of a very old account of Anson's voyage, by a Mr. Walter, written in 1748; his actual words are, speaking of the Spanish Admiral Pizarro's flag-ship going round the Horn, "being off Cape Horn and going before the wind in very moderate weather, with a swelling sea, by some misconduct of the Officer of the watch, the ship rolled away her mast, and for the second time he was obliged to put back to the River Plate." I also made a mistake as to the percentages. Admiral Brine was sharp enough to see that; the percentages are liable to be misunderstood, and I propose to alter them.

Admiral COLOMB: It depends on whether you take the percentage of the whole.

Admiral FREMANTLE: Eighty-seven is about 45 per cent. of the whole amount; it is 90 per cent. as compared with the sailors and marines, that is, the percentage of non-combatants to combatants is right, but the percentage of non-combatants to the whole amount is not correct. Admiral Long made some remarks about the difficulty of getting statistics as to the merchant seamen. That is true enough. It is extremely difficult to get any statistics, and when you ask the question you are told that the fact is that many Norwegians, Danes, Germans, and other good people enter themselves as if they were English, although you can see clearly enough by their manner that they are not. There is no machinery, I believe, by which the Board of Trade can tell us what number of English seamen we have. Mr. Forwood talked of increasing the number by 10,000 in the Naval Reserve, but we heard from Admiral Field that he did not think there were more than 40,000 British seamen altogether in the merchant service, and my own impression is that that is pretty correct. Admiral Long criticized somewhat my proposal about enlarging the Navy. He agrees that it should be enlarged, but he does not give us any account as to how exactly it should be done, except, as far as I can make out, that we should have more ships, and spend more money. I think we



want a very largely increased Reserve, and if that is the case, we must have something a little different from what we have had hitherto. That has been the only idea, more ships and more money. What we really want is an expansive Navy, and not so much an expensive one; that is my idea. There has been a misunderstanding by several speakers, including Admiral Long, as to recommissioning abroad. I distinctly said I do not approve of recommissioning abroad. Therefore I do not think there will be more recommissioning abroad, but on the other hand decidedly less. Technically, there will be very much less; Captains will be relieved every two years, and other Officers every two years. [A Member.—How about the Admirals?] It might be a good thing also to relieve Admirals in two years. As far as discipline is concerned, it will be a very good thing. As far as political requirements are concerned, it would be a bad thing. As far as discipline is concerned, as in the Channel Fleet, it is an extremely good thing to relieve the Admiral every two years, and it would be a great mistake to have him there for three years; but you must recollect that, whether in the Mediterranean or on other foreign stations, there is a great deal of political work which is done by the Admiral, and, from a political point of view, the Commander-in-Chief is better for being kept there longer; but in all other respects I should say distinctly that two years is long enough for fish, flesh, or fowl, which includes the Admirals, of course. I do think it would be a very good thing to constantly keep ships going as a going concern. People's ideas are such that, when a new Captain and a new crew come to a ship, he always wants to pull everything to pieces. I have myself experienced that when a man is leaving he considers that his ship is in a very good state; all is going on first rate, in fact. I might mention the "Boadicea" as an instance; she steamed 12 knots all the way from Colombo to Aden; she did more than 12 knots up the Red Sea, and therefore could not be in a bad state. When, however, she arrived at Malta to recommission, everything had to be pulled to pieces to satisfy the new people, and we have heard since by the papers that she was in a very bad state. I do not deny that it is satisfactory with regard to the machinery to have it taken out and examined from time to time to see what state it is in, but this is frequently done on change of Officers when it is unnecessary; and if the instructions said it was not necessary, and that you were not allowed to do it in the middle of the commission, the responsibility is not yours. The ship has been running very well, we will suppose, and pulling her to pieces is unnecessary and expensive, and does not tend to efficiency in any way. I should like to avoid that. Admiral Bowden-Smith appears to have particularly misunderstood me as to the question of men leaving after seven years. If anybody will read my lecture carefully, he will see that a man is bound to serve twelve years from the age of eighteen as a minimum; he has seven years under the pennant as a minimum, and then he must go for five years into the Reserve, after which he is free. I propose to offer him a somewhat easier service for the next seven years if he chooses to re-enter for that time at the expiration of his first seven years. Therefore I take every man for a minimum of twelve years. I also want to get some men for fourteen years, and I hope to get some for twenty-two years, and my idea was that 10 per cent. were to enter with a view of going on and becoming petty officers, or continuing their service to complete for pensions under the pennant. I do not advocate short service as it is generally understood. It is very natural after what has taken place in the Army, where a great deal has been sacrificed to short service, to say do not let us have the same in the Navy. Admiral Bowden-Smith himself says that none of our ten years' men, who, if you please, do not get any pension at all, or any reserve pay, or anything else, do not come on the rates. Why not? Because they have a profession. But I am proposing to put people in the Reserve who will get a month's training, which the Army do not. I propose to pay them a retaining fee, and they have their trade after that, and the fact remains that the ten years' men do not come on the rates. It is no use talking about copying the Army: I would copy anything that is good. It is a very common thing if anybody has any objection to anything to set up a prejudice by saying, "Oh, the Germans have got it, or the French have it: we do not copy the Germans or the French." The fact is, there is nothing original under the sun,



and every idea that I have in my head, and I believe most of the ideas in most people's heads, have come out of somebody else's heads. The two years system I believe to be perfectly practicable abroad; at all events, I can never see why the Germans can change their men, why the Frenchmen in Madagascar can change their men, and say exactly to a month or two when the exchange will come, and yet we cannot do the same. Three years is supposed to be the time, but it very often gets very near to four years. I fail to see why we cannot relieve people every two years. It would be a good thing for the health of the men. Some of the Captains on the East Indies station whom I see present here will corroborate what I say, viz., that in the third year of commission in a tropical climate the men break down very much, and that many a good man might have been saved to the Service, and to himself and his wife and family, if the ships had been sent home in two years instead of three. Admiral Field also misunderstood, to some extent, the time of service, and spoke a great deal about industrial school ships and reformatories. There is no difficulty at this time in getting boys, and therefore I do not think that question arises. Admiral Lindesay Brine said if we wanted a Naval Reserve, we could get it from the pensioners of the Navy, that is, from men after they have reached forty years of age. He said he would get several thousands; afterwards he said 5,000.

Admiral LINDESAY BRINE: I thought so.

Sir EDMUND FREMANTLE: It may be so, but we heard from Sir Edmund Commerell that when he wanted them in peace-time, and offered a very fair inducement, he could not get them.

Admiral LINDESAY BRINE: That is only as volunteers, but these men are obliged to come. Their addresses are known; they are paid by Paymasters, and they can all be got in case of war.

Sir EDMUND FREMANTLE: But I maintain they won't be of much use. As a rule, sailors, on board ship, after the age of forty, are generally looked upon as very old fellows. We think everybody is young who is about fifteen years younger than ourselves, but I think if you were to poll the ships' companies in Her Majesty's Navy, and ask them about people over forty, they will tell you they were rather old for the trade. That is entirely corroborated by Sir Edward Commerell. If you take 90 per cent. of the men over forty, you will find, on their part, a great reluctance to go into sea-going ships, and if they were forced to go, I doubt whether you would find them as efficient as you would like. I prefer younger men myself; if it is a good thing to have these men at the age of forty, it must be a very much better thing to have some Reserve men at the age of thirty. I should like to have them if I can. Sir E. Commerell addressed himself to the "fringe of short service"—a very good expression! I admit it is a "fringe," and many people do reasonably object to the "fringe of short service," and to that I plead guilty; but I think they are a little frightened by the name, and that some modified form of short service, if people would only think it over, will be a very great improvement on our present system, which is really, although thoroughly efficient for a moderate Navy, not thoroughly efficient for a very large Navy, and we must have now, as I have endeavoured to show, a very large Navy. There was a letter in the "Times," written not very long ago, by "Au Courant," and he actually argued that, as we have very few seamen, we must have small ships; that we cannot afford to man big ships. I think that is really putting the cart before the horse, and if that is to be the result of our having a sort of standing Navy of this kind, it will be dangerous for the best interests of the country. Before I sit down I should like to refer to a point which, to my astonishment, has been very little referred to. I rather challenged criticism as to the training of our men. I did not say that I would keep on the "monkey top-sails" or "bends and hitches." I proposed to modify that. I think it is a matter of detail, but I pointed out that even according to the present view of the training Officers of the Admiralty, that if you take away those two subjects which I have italicized, there will still be a good deal of seamanship left. I should like to see the list modified considerably in certain details. I did expect to be directly challenged as to what our sailors were to be in the future. Two lectures have been given in this Institution recently, and received with great approval by many distinguished Officers, in which it was

said that everything was going to the bad rather faster than usual, that everything would have gone to the bad absolutely when masts and sails were finally abolished.

Admiral BOWDEN-SMITH: When that question was brought before the Institution the majority of opinion was decidedly against masts and sails.

Admiral FREMANTLE: The snake may be scotched, but it is not killed. I received a letter this morning from a distinguished Officer whose opinion I value very much. I will not mention his name, but he said he would go so far as to paraphrase the expression of a French philosopher, and say that, if masts and sails did not exist it would be necessary to invent them, to ensure the efficiency of navies. He does not tell us how he is going to invent them. Therefore, I maintain that those people who wish to retain masts and sails, and make that entirely the foundation of our training in future, are bound to say into what ships they will put them, and where they will put them. I do not know if there are any Home Rulers here, but it is rather like the Irish Home Rule Bill. Before the Bill comes out they say, "Oh, we are going to make a Bill so that it shall be all right, and the supremacy of the British Parliament will be maintained." So it is as to the sails. Everything is all right. "We are going to keep masts and sails, we are going to have the maritime supremacy of this country maintained," but they cannot tell you how it is to be done. Directly they bring their little Bill on the table they find a great difficulty. I am very much obliged for the kind way in which very many of you have spoken of my lecture. I did not expect it to be received with general approval, but I do wish people would look into the question of short service, upon which I think we have dwelt a little too much, while, on the other hand, we have dwelt too little on the question of training. My proposal is made after great consideration, and I have overcome some prejudices in making it. I have stated that the first line of defence was the most important thing in my opinion—that is, to have our ships well manned, well armed, well disciplined, well officered—rather than to have a large and inefficient Reserve. At the same time, on looking into the matter, I was very much impressed with the fact that we have not got enough people, and I do differ certainly from Admiral Long and others, who seem to put on one side that question, to throw overboard the short service, and say, We won't have anything to do with short service. In that case you will want simply a larger and more expensive peace Navy, and I am sure you are asking for a thing which is not exactly reasonable, and which you are not likely to get. Therefore, I ask people to look with a little less prejudice upon a proposal for creating a Navy which shall give us a more reliable reserve in case of war. It appears to me, as regards the short service, that the Army, the very people who ought not to have adopted it, did adopt it, and that the Navy, who really ought to have adopted it, as the men have a profession to fall back upon, have not tried it.

The CHAIRMAN: I am sure you will empower me, in your name, to return our hearty thanks to Admiral Fremantle for his most excellent lecture.



## FOREIGN SECTION.

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THIS portion of the Number, hitherto the Occasional Notes, has now become the Foreign Section, and is reserved for articles, either original or compiled, on professional subjects connected with Foreign Naval and Military matters; also for notices of Professional Books, either Foreign or English.

The Council of the Institution wish that this section shall be developed still further, and I have undertaken to continue my Editorship during the current year, with a view of aiding them in carrying out this work. It seems to me possible to make this section, and consequently the Journal, the means of keeping our Members acquainted with all naval and military progress abroad *pari passu* with that progress; and I shall be glad to receive from members of both Services, including in the latter those of the Auxiliary Forces, suggestions, information, or offers of assistance.

It is desirable, further, that I should state that, as regards editing the Naval matter in the Section, I shall have the aid of Naval Officers, thoroughly competent to give good advice and to pronounce sound opinions.

It must, however, be borne in mind that, as the change from a quarterly to a monthly issue has been made in order to ensure the more prompt publication of the Lectures after their delivery than has hitherto been the case, the Foreign Section will, as a rule, be restricted in extent during the Lecture season in the first half of the year, and will be prominent in the second half.

It is requested that communications and books for review (the latter under cover to the Librarian) may be addressed to me at the Royal United Service Institution, Whitehall Yard, London, S.W.

LONSDALE HALE,

Colonel R.E. ret.

## THE RUSSIAN NAVAL MANŒUVRES OF 1891.

Translated by permission from the "Marine-Rundschau" by  
Commander H. GARBETT.

### I. *The Idea of the Manœuvres, the Vessels engaged, and the Manœuvre Regulations.*

For the purpose of this year's manœuvres of the Russian Fleet, the ships composing the Baltic Squadron were divided into two squadrons, intended to operate the one against the other. The attacking squadron was placed under the command of Vice-Admiral Kasnakow, who had Rear-Admiral Lazarew as his second in command, and consisted of the following ships and vessels:—

	Displacement.	Speed.
The ironclad "Emperor Nicolas I".....	8,840 tons	.. 15
"    "    "Emperor Alexander II" ..	8,840 "	.. 15
"    "    "Duke of Edinburgh" ....	4,600 "	.. 14
"    "    "Admiral Greig".....	3,593 "	.. 10
The corvette "Rynda" .....	2,950 "	.. 15
The clipper "Najesdnik" .....	1,334 "	.. 13·5
"    "    "Wjästnik" .....	1,256 "	.. 13·5
The torpedo-cruiser "Lieutenant Iljin" ..	595 "	.. 18
The torpedo-boat, 1st class, "Reval" ....	100 "	.. —
"    "    "    "    "Lachta" ..	74 "	.. —
"    "    "    "    "Narwa" ..	74 "	.. —
"    "    "    "    "Ekenäs ....	81 "	.. —
The transport "Artelschtschik" .....	577 "	.. —
"    "    "Samojed" .....	771 "	.. —

Vice-Admiral Kasnakow had his flag hoisted on board the "Duke of Edinburgh," and Rear-Admiral Lazarew his on board the "Emperor Alexander II."

The defending squadron was under the command of Rear-Admiral Gerken, with Rear-Admiral Walizki as his second in command, and was made up as follows:—

	Displacement.	Speed.
The ironclad "Admiral Spiridow".....	3,740 tons	.. 10·5
The armoured gunboat "Tscharodeika" ..	2,020 "	.. 8·5
"    "    "Grosjaschtschi" ..	1,490 "	.. 15
The corvette "Skobelew" .....	2,400 "	.. 12
The clipper "Strelok" .....	1,340 "	.. 11·5
"    "    "Plastun" .....	1,250 "	.. 12
The gunboat "Snjeg" .....	400 "	.. 9
"    "    "Gross" .....	400 "	.. 9

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	Displacement.	Speed.
The gunboat "Jersch".....	360 tons ..	9
" " "Wichr".....	394 " ..	9.5
" " "Burun".....	413 " ..	9
Torpedo-boat, 1st class, "Abo" .....	76 " ..	—
" " "Borgo" .....	81 " ..	—
" " "Kotlin" .....	67 " ..	—
" " "Luga".....	74 " ..	—
" " "Sveaborg".....	100 " ..	—
The schooner "Slawjanka".....	162 " ..	—
And eight 2nd class torpedo-boats.		

The relative strength of the two squadrons was almost identical with that of the preceding year, the attacking squadron being the same numerically, viz., 4 ironclads, 1 corvette, 2 clippers, a torpedo-cruiser, and 4 1st class torpedo-boats, while the defending squadron this year was stronger by a corvette and a 1st class torpedo-boat. The real fighting strength of the attacking squadron this year was, however, greater than that of last year, as two of the ironclads were the new seagoing battle-ships "Emperor Nicolas I" and the "Emperor Alexander II."

The general idea of the operations was almost identical with last year's, and was as follows:—

A hostile squadron commanded the Baltic and Gulf of Riga, and had established itself in the Moon Sound. The sound was used as a base of operations in order to blockade the Gulf of Finland, to destroy the seaborne trade, and to damage as much as possible the trading ports between Sveaborg and Björkö. The defending force lay partly in Sveaborg and partly in the Finnish fiords and inner waters protected by the shoals along the coast. The enemy's aim was to keep the ships in Sveaborg shut up there, and to prevent a junction of his opponent's forces, while he at the same time attacked the vessels distributed among the fiords and inner channels. The defending Commander, whose duty it was to defend the principal Finnish seaports, utilizes the separation of the enemy's forces to attack his single ships: he also endeavours to break through the blockade established by the enemy from the Finnish fiords and the roadstead of Helsingfors, and, concentrating off the Moon Sound, cut off his opponent's communications with his base. His principal object is to collect his force in Sveaborg, and then threaten the enemy in rear. The general outline of the manœuvres was, therefore, the same as last year. No hard and fast instructions which would interfere with the free hand of the two Commanders were given, but the following regulations were laid down:—

1st. The whole attacking squadron was to assemble in the Moon Sound on the 15th August. The defending squadron was to be distributed at the same time in Sveaborg and the fiords and channels lying to the east of that port.

2nd. The entrances from the sea to the different fiords and the channel up to Sveaborg were considered as barred by mine-fields, in

addition to which the mine-field at Rotschensalm, in the channel leading to the Little Pelling and the Trangsund, was supposed to be defended by light artillery. The Commander of the defending squadron was to draw out plans for the mine defences, and communicate them to the Umpire-in-Chief.

3rd. Reval, Porkala-Udd, and Hangö-Udd were also considered as fortified and protected by mines, so that these roadsteads could not be used or captured by the enemy.

4th. It was further understood that a portion of the hostile fleet should be stationed off the Tolbuehin Lightship and blockade Cronstadt, so that the route to the fortress behind the Meridian of Werkömatala was barred to the defending squadron.

5th. The enemy was forbidden to obtain or transmit news by telegraphic despatches, and was ordered to trust entirely to the scouting of his own ships for news of the movements of the defenders.

6th. The defending force could avail themselves of the land telegraphs and signal stations erected on the coast for learning and transmitting all the movements of the enemy.

7th. The supplying of the ships of the attacking force with coals and provisions was to be carried out from the Moon Sound, and for this purpose the transport "Artelschtschik" and the schooner "Samojed" were detailed.

8th. From 4 A.M. of the 16th August all merchant ships which were met by the ships and torpedo-boats of the defenders in their sorties from the different fiords, and whose names were ascertained and entered in the log-book, were to be considered as ships of the enemy captured while conveying stores, &c., for the fleet of the latter. It was a condition, however, that the capturing vessels should not themselves be destroyed or taken by the enemy, as in that case the prizes were also lost.

9th. If mines were laid down anywhere by the enemy in order to prevent the breaking out of the defending ships, the vessels engaged in laying the mines were to remain on the spot out of range, unobserved sufficiently long to lay the necessary number of mines to form a barrier, and were not to be driven off; and in laying down the mines only that number could be counted which were actually on board the ships of the squadrons.

10th. In order not to interfere with the movements of merchant ships, no buoys or other marks were to be laid out as a sign of a mine-barrier.

11th. The attacking squadron must use avisos for discovering the positions of the defender's forces.

12th. The Commandants of the manœuvring squadrons were to have charts made out twice a day, showing the position of the enemy's ships according to the latest news received. The ships were to be designated not by their names, but by their description.

The following Officers were named as Umpires:—Vice-Admiral Strzenkow, Umpire-in-Chief; Rear-Admiral Makarow and Captain of the First Grade Wulf as Umpires; two Staff or subordinate

Officers were attached to each Umpire. The Chiefs of the manœuvring squadrons were to communicate their plans to the Umpire-in-Chief.

In addition to the foregoing manœuvre regulations, certain other rules were laid down, which were to form the basis for deciding on the operations of the squadrons or single ships. These were as follows:—An action could only be successful if the opposing ships were under 12 cable lengths (2,200 metres) apart. If the number of guns of similar calibre of one ship was double that of her opponent, the latter would be considered out of action after an hour's fight, and, upon signal from the Umpire, was to leave the field of battle, unless the stronger ship had neutralized his superiority by bad handling. An action an hour in length was, however, to be accepted as normal, according to which the victory would be decided. Each ship received a co-efficient of strength, according to which—

6-inch (15 cm.) gun.....	= 1
8- and 9-inch (20 and 23 cm.) guns ..	= 2
11- and 12-inch (27·5 and 30 cm.) guns	= 3
9-pr. (6·3 cm.) gun .....	= $0\frac{1}{2}$
47-mm. gun .....	= $0\frac{1}{4}$

The co-efficient of strength of a ship followed, then, from the sum of the number of her corresponding guns; according to which, for example, the co-efficients of the following ships were—

The "Emperor Nicolas I" and "Emperor Alexander II"	= 26·5
„ "Rynda" .....	= 13·5
„ "Grosjaschtschi" .....	= 3·0
„ "Lieutenant Iljin" .....	= 1·25
„ Clippers .....	= 5·5
„ "Admiral Greig" .....	= 10·75
„ "Admiral Spiridow" .....	= 8·25
„ "Tscharodeika" .....	= 8·0

In the event of a ship approaching within 4 sea miles of a fortress and remaining exposed to its fire for fifteen minutes, she was to be considered out of action, so also was a 1st or 2nd class torpedo-boat which approached within a mile and remained under fire. If a ship lying at anchor was approached within three cable lengths (550 m.) by one of the enemy's with the obvious intention of ramming, she was to be put out of action. All ships which had been put out of action by the Umpires were to leave the scene of action, and take no further part in the manœuvres for twelve hours. If an armoured vessel met an unarmoured ship, the probability of victory for the first was three to one, in the case of an armoured ship against a half-armoured one, or the latter against an unarmoured one, the chances were to be considered two to one. Fire was only to be opened against the enemy after careful aim and judging of his distance, and only from those guns which could actually be brought to bear against him. If a

torpedo-boat approached a ship within two cable lengths (365 m.) without being fired at, the ship was put out of action; the same thing occurred to a ship which had her torpedo-nets out, if two torpedo-boats were allowed to approach within two cable lengths. If, on the other hand, a torpedo-boat at a distance of less than seven cable lengths (1,280 m.) was exposed for three minutes to the fire of a quick-firing gun, or for two minutes to the fire of two or three quick-firing guns, or one minute exposed to the fire of four or more, she was to be considered as destroyed. Should several boats attack a ship simultaneously, the time in which they might remain under fire without being destroyed was prolonged by a minute. Torpedo-boats which had discharged the torpedoes in their tubes were to retreat out of range of the ships while they reloaded, in the event of their having spare torpedoes on board. For the reloading, at least half an hour was to be counted. A torpedo-boat was to be considered out of action, 1st, if she singly met two hostile boats, 2nd, if, when lying at anchor, she was attacked by another boat. With regard to the mine-barriers, the following regulations were laid down:—

Should a ship pass over a hostile mine-field which was known to the Umpire, without having searched for mines, she was to be considered as destroyed. Should several ships in line ahead pass over a mine-field, without first removing the mines, the foremost ship in narrow channels was to be considered as destroyed, and in large channels the two foremost ships. A mine-field was only to be considered effective if three rows of mines with not more than 100 feet (30·5 m.) interval between the mines were laid down. Two boats which could be sent in advance to remove the mines were to take at least ten minutes for each mine and must work on the exact spot where the mine-field had been considered as laid. Whether the work was successfully performed or not would be communicated by the Umpire by signal.

The using of hired boats and vessels which carried a foreign flag and the wearing of plain clothes by Officers and men were forbidden.

In addition to the general strategic and tactical duties of the squadron experiments were to be made as to the best form of signals for distinguishing friends from enemies, and the effective zone in which 1st and 2nd class torpedo-boats can act independently was to be carefully ascertained.

## II. *The Operations during the Manœuvres.*

After the two squadrons had taken up their respective stations, the manœuvres immediately commenced, and lasted from the 16th to the 20th of August. The reports about the course of the operations and the performances of individual ships are not sufficiently in detail to allow us to trace out a perfect picture of all that took place, but they suffice for a general review. On the morning of the 16th, the attacking Commander found himself with his whole force in the western portion of the Gulf of Finland. Of the ships told off for the squadron, the "Nicolas I" appears to have been withdrawn, as she is never mentioned. The Commander-in-Chief divided his ships into three

squadrons; the first consisted of the armouredclad "Duke of Edinburgh," the corvette "Rynda," and the torpedo-boats "Narwa" and "Lachta"; the second of the armouredclad "Alexander II," the clipper "Wjästnik," and the torpedo-boats "Ekenäs" and "Reval," and the third of the armouredclad "Admiral Greig," the torpedo dispatch-boat "Lieutenant Iljin," and the clipper "Najesdnik." The second division received orders to reconnoitre the fiords from Helsingfors to Aspö, and to ascertain the strength of the enemy in that part. While they steamed to perform this duty, the two other divisions proceeded eastward, keeping as far to the southward as possible. The "Lieutenant Iljin" was dispatched to thoroughly reconnoitre the fiords between Aspö and Björkö; the squadron, after passing Hogland Island, kept to the eastward of the island during the night, and remained there till morning with their lights masked. Early in the morning of the 17th, the transport "Artelschtschik" joined the squadron, and with its help, a landing brigade was conveyed to the northern point of the Hogland Island, and occupied the village there without meeting any resistance. Soon afterwards, the second division rejoined the flag, reporting that the fiords from Aspö to Helsingfors were apparently not occupied, while the enemy, as far as could be seen, had collected his force in the latter port. The Commander of the squadron, Admiral Lazarew, therefore received orders to blockade Helsingfors with his force, and above all things prevent the defenders from breaking out to sea. After the second division had again parted, the "Lieutenant Iljin" returned from reconnoitring, and reported that she had searched the Björkö Sound and the Great Roads of Trangsund without seeing anything of the enemy, she, therefore, considered it certain a division of the defending squadron was concentrated at Aspö. In order to ascertain this for certain, the Admiral dispatched the "Rynda," accompanied by the torpedo-boat "Narwa," with orders to go to Aspö.

During these events, the defending Commander also took his measures to carry out the duties assigned to him. He divided his force into several unequal divisions, and dispatched them presumably within the fiords to those channels which lead to the more important coast towns. In Helsingfors there remained the armouredclad "Admiral Spiridow," the armoured gunboat "Grosjaschtschi," the corvette "Skobelew," the gunboats "Grosa" and "Burun," as well as the torpedo-boats 1st class "Abo," "Kotlin," and "Sweaborg," and some 2nd class boats; the armoured gunboat "Tscharodeika," the clippers "Strelok" and "Plastun," the gunboats "Jersch" and "Wichr," the schooner "Slawjanka," the 1st class torpedo-boats "Borgo" and "Luga," as well as four 2nd class boats, were sent to Aspö, while the gunboat "Snjeg" and a 2nd class torpedo-boat went to Trangsund. When the last-named vessels arrived at their post is not given, but they probably arrived almost immediately after the "Lieutenant Iljin," having made her reconnaissance, had again left.

On the 17th, at 8 p.m., the torpedo-boat "Narwa" returned from Aspö, and reported that five of the enemy's ships were off the roadstead, and that they had discovered the presence of the "Strelok,"



"Plastun," "Borgo," and "Luga." The "Rynda" had been surprised and attacked by the two torpedo-boats, but the attack had failed, as the high sea running made it impossible for them to approach the corvette within range; she, on the other hand, had fired at the boats with her quick-firing guns, and having kept them under fire the allotted time both boats were put out of action. At the conclusion of the action the "Rynda" left for Björkö Sound. After she had searched for mines, but finding no enemies, she proceeded to the Great Roads of Trångsund. Here the gunboat "Injeg" and a 2nd class torpedo-boat were lying, and after a short action they were forced to succumb to the superior force of the "Rynda."

While the attacking force had thus scored some successes, the defenders did not remain inactive, but were bestirring themselves to damage the enemy. A particularly smart blow was dealt the enemy by the gunboat "Grosjaschtschi." She succeeded, on the evening of the 17th, in breaking through the blockade maintained by the "Alexander II," the "Wjästnik," and two torpedo-boats, and escaped to sea. She must have slipped away quite unseen, else it is difficult to explain why she was not pursued. The "Grosjaschtschi" next captured, in accordance with No. 8 of the Manœuvre Regulations, a number of transports belonging to the enemy, and then went on to the Moon Sound. Here she destroyed all the coal and provision depôts, laid out a number of mines, and returned, unattacked, to Helsingfors. By this operation the attacking fleet was robbed of its base, and was compelled to establish a new one.

In the night of the 17th—18th, followed, on the side of the defenders, an attack by torpedo-boats on the enemy's squadron, which was lying at anchor off the northern point of Hogland Island; although they had guard-boats on the look-out, their torpedo-nets were, apparently, not out. When Rear-Admiral Walizki, who was lying at Äspö with a division of the defending squadron, learnt the position of the enemy, he dispatched the three torpedo-boats "Borgo," "Luga," and "Kotlin" to the attack. About 9 p.m. the boats left the roadstead. The hitherto strong south-westerly wind had subsided somewhat, but the sea was still high. The torpedo-boats had to steam against wind and sea, so the "Borgo," which was the fastest, drew ahead of the others; when she arrived off the northern point of Hogland she kept close under the land and proceeded along shore. About 10.50 p.m. she discovered the masts of the enemy's ships, which showed out against a tolerably clear horizon, and the boat, which had now approached towards the centre of the squadron, shaped its course for the most seaward of the ships, and steamed full speed towards her. After she had turned, she steamed alongside and gave some short whistles as a signal of the complete success of her attack; steering again to Hogland, she now received the first shot from the blown-up ship, which was the "Admiral Greig," and immediately the whole squadron opened fire. The confusion was utilized by the "Luga," which had now come up, to steer through the unilluminated part of the sea until she was close

under the stern of the "Duke of Edinburgh" and to discharge her torpedo at close quarters. Both torpedo-boats escaped after having made a most successful attack.

In view of the reconnaissance which had been made off Aspö, the attacking Admiral determined to proceed there at full speed against the reported weak force of his opponents, and to cut them off from the squadron in Helsingfors. For this purpose, at daybreak on the 18th August the frigate "Duke of Edinburgh" (although by the regulations she was out of action until midday), the cruiser "Iljin," and torpedo-boats "Lachta" and "Narva" proceeded to Aspö, to prevent the defenders' ships from breaking out. After the mine-field had been cleared away at the entrance and the squadron was approaching the Luppi Beacon, the Admiral observed that the three ships of the enemy, the gunboat "Tscharodeika," the clippers "Strelok" and "Plastun" were steaming full speed through the fiords to the west, apparently in order to join the main body of their fleet. In order to prevent this, Admiral Kasnakow signalled to the ironclad "Admiral Greig," the clipper "Najesdnik" and the torpedo-boats "Reval" and "Ekenäs" to close, and as soon as they had joined him, he steamed with his whole force in column in line ahead on a course parallel with the ships of the defenders. As the latter were inferior in speed and force to the attackers, Admiral Kasnakow pursued them for only as long as was necessary to put them out of action. However, it is not quite certain whether he succeeded in this, and it is not quite easy to make out what exactly did take place. During the artillery duel the "Iljin" and four 1st class torpedo-boats undertook an attack upon the enemy's ships; the torpedo-boats, however, failed in their part, and only the "Iljin" was in a position to discharge two torpedoes at the "Tscharodeika," but with what result is not known. When the action was ended, Admiral Kasnakow turned back and looked for the other portion of the defending force. At two different stations within the fiords were discovered the gunboat "Wichr" with two 1st class torpedo-boats, and further under the land the gunboat "Jersch," schooner "Slawjanka," and two 2nd class torpedo-boats, which had all come out from Rotschensalm in order to rejoin the other ships of the detached squadron, under the orders of Admiral Walizki. Admiral Kasnakow directed the "Iljin" to attack the "Slawjanka," while the clipper "Najesdnik" and the torpedo-boats "Lachta" and "Narva" dealt with the "Wichr."

Both attacks failed, as the "Slawjanka" managed to escape through the inner channels, while the "Wichr" was fortunate enough to take up so favourable a position in the narrow channel Kitelsund, by the island of Sur-Musta, that she could not be reached. The "Lachta" and "Narwa," in their attempts to take the gunboat in rear, were suddenly attacked by two 2nd class torpedo-boats, which had been lying completely concealed behind the nearest islands, and according to the rules they were put out of action, as they were at the same time subject to the fire from the quick-firing guns of the "Wichr." The "Lachta" also, in manœuvring in the narrow channels, took the

ground, but without sustaining any damage. The "Wichr," however, took advantage of the unfortunate position of the two attacking gunboats, and steaming out of the narrows with the two 2nd class boats she attacked the "Najesdnik" and forced her to withdraw.

After the failure of the enemy's squadron in their attempts against the fiord-flotilla, the Admiral re-anchored in the roadstead off Fort Slawa, and sent the torpedo-boats "Ekenäs" and "Reval" to join the division blockading Sveaborg. The night of the 18th—19th August passed quietly, and the next morning the squadron weighed, and returned to its old anchorage off Hogland Island. Here also returned, in the course of the morning, the "Ekenäs" and "Reval," which, having been repulsed in an attack upon the ironclad "Spiridow" and the corvette "Skobelew," were placed out of action.

In this attack, which probably took place off Helsingfors, the torpedo-boats, however, succeeded in destroying the gunboat "Grosa," which, believing them to be friends, allowed them to approach without opening fire upon them.

During the 19th of August the attacking squadron remained at its anchorage and completed with coal from the "Samojed" and transport "Artelschtschik."

At 6 P.M. the ships weighed, and taking the channel south of Hogland, steamed in two columns to the westward. The defending squadron was so weakened by having to detach vessels to Aspö and Trangsund, that it was not in a position, without recalling these ships, to undertake the duty of threatening the enemy in rear. As the Commander did not succeed in reuniting his ships at the proper time, nothing finally remained for him to do, except to give battle off the roadstead. When, therefore, at daybreak on the 20th August, the attacking squadron hove in sight of the Grahara Lighthouse, the ships of the defenders were observed to have left the roadstead of Helsingfors and to be standing to the eastward. A dense fog which set in prevented any operations during the forenoon, and concealed the movements of the opponents; when it again cleared, it was evident the defending Commander wished to fight a decisive battle. After the armourclad "Alexander II" and the clipper "Wjästnik" had rejoined the attacking force, the squadron formed line-of-battle in columns of divisions in line ahead, and advanced to the attack.

At a distance of about 3 sea miles from the enemy, Admiral Kasnakow re-formed single column in line ahead, and opened fire at about 4,000 yards (4,000 m.) upon the enemy, who had adopted a similar formation. After both squadrons had maintained for an hour an ineffective cannonade, and were off the Sztina Shoal, the Commander of the attacking squadron, about 5 P.M., ceased the action, and the manœuvres came to an end.

### III. *Critical Discussion of the Manœuvres.*

In the Russian manœuvres, perhaps, in consequence of the very meagre reports which have been made public, were only a few

occurrences which have a further interest in their bearing on the solving of tactical and strategical questions.

The forces were insufficient for carrying out the duties assigned to them, and the time allowed too short. Nevertheless, certain actions were fought, which deserve attention, as they throw a light upon the influence of local surroundings outside the general maxims for carrying on of war, and also upon the value of certain rules and the correctness of old lessons. The general idea was the same as last year, the seat of operations was the same as it would be in war if Russia should be attacked by a superior naval force. In consequence of the great extent of coast which had to be taken into consideration, and the proportionately small forces which took part in the manœuvres, a number of assumptions were necessary, which gave operations a fixed direction, which would not have been the case had the attacker had freedom of movement and action, and not been restricted to time. Thus, the principal seaports of the south coast of Finland were closed to him, and there were everywhere mine-barriers, partly protected by artillery, where the channels through the shoals lead to the small ports between Sveaborg and Björkö. In addition, the entrances to Hangö and westward from Helsingfors-Sveaborg, were considered as fortified and impregnable. The other assumptions corresponded, as far as is possible in manœuvres of this kind, with the reality. The defenders had at their disposal all the means of obtaining information with which the country is provided, while the enemy had to depend upon his dispatch vessels. The coaling of the latter could only be carried out by means of the transports he brought with him; and for the laying and removal of mine-fields exact and sufficiently stringent regulations were provided. A regulation which in no way accords with what would actually take place, and which, therefore, led to false conclusions, was that which permitted all merchant ships, which were met by the defenders, and whose names were read, to be considered as captured transport ships of the enemy. Here, at least, a settled time for taking possession and fixed rules for disposing of them must be laid down. The rules which regulated actions between ships and torpedo-boats were not very different from those adopted by other countries, and their weakness lay in the peculiar conditions of the channels, which did not permit the tactical carrying out of an action such as one would have wished, and which is possible on land.

Not altogether free from objections was the rule according to which a ship on the ground of a merely superior armament was to be considered the victor over the one opposed to her. If the number of guns of a similar calibre was double, the weaker of the two ships after a fight of one hour's duration was to be considered out of action. But strength co-efficients were allotted to the individual ships, and these were solely fixed by the calibre of the guns on board. As all the ships did not possess guns of the same calibre, it appears as if the co-efficients of strength of the ships in considering their value had been laid down on the basis of guns of equal calibre. This regulation was somewhat arbitrary, as armour protection, speed,

and torpedo armament were not at all taken into consideration. Still the laying down of a simple and hard-and-fast rule, which was easily understood, avoided the difficulty of having to settle points which would have been difficult to determine and involved in doubt. Nor really in accordance with probabilities was the rule which put a ship exposed to the fire of a fortress for fifteen minutes at a distance of less than 4 sea miles, out of action, and a torpedo-boat also under similar conditions if under a mile. As a matter of fact neither a ship nor torpedo-boat would run much danger under those circumstances. Very much to the point and important was the rule that only such guns should be counted which could be really brought to bear against the enemy. The Russians do not seem to set much store by the use of torpedo-nets, as, according to the rules, a ship provided with net protection could be put out of action if two torpedo-boats got within 400 yards of her. The rules for laying down and removing mines were also practical.

With regard to the manœuvres themselves, there are two principal events which claim especial interest. The first is the breaking of the blockade by the armoured gunboat "Grosjaschtschi," and her successful destruction of the base of the enemy at the Moon Sound. The attacking Admiral had left his base with all his force, and there appear to have been no steps taken to secure it against a *coup de main*. This neglect is quite unintelligible, and can only be explained on the supposition that Admiral Kasnakow did not consider it possible for the defenders to break through the blockade. By the operations of the "Grosjaschtschi," whose Commander, Captain of the Second Grade Roshdestwenski, displayed great boldness and foresight, the hold of the enemy upon Hogland had to be withdrawn. As soon as his base was destroyed, the attacking Admiral had to withdraw and establish a new one, or else leave the Gulf of Finland altogether until new reinforcements could reach him. It would appear from the fact of so little notice being taken of this incident as if the object of the manœuvres was rather tactical than to learn strategical lessons.

The second incident of greater importance was the attack by torpedo-boats on the enemy's squadron off Hogland. The attack was completely successful, because no satisfactory look-out appears to have been kept or sufficient measures of precaution taken. A squadron which lies at anchor at night only 12 or 15 sea miles from the enemy is liable to great danger through torpedo-boat attacks, and only very special and pressing reasons should commit a squadron Commander to such a step. In any case, every precautionary measure should be taken in order to discover in good time and defeat any attack. This appears to have been completely neglected, and the result was the loss of two battle-ships.

The torpedo-boats had during these manœuvres several opportunities of acting, but they did not always meet with the same success. It is clearly shown that surprise is a necessary element for the success of torpedo attacks. In this regard, the action of the "Lachta" and "Narwa" against the gunboat "Wichr" points a

lesson, where the first-named were thus suddenly attacked by two 2nd class boats, and in consequence were forced to succumb. Here the nature of the surroundings of the scene of action, which permitted the total concealment of the two smaller boats, made a complete surprise possible.

*Note.*—The term fiords is used to denote all the channels and waters which lie inside the numerous reefs and islands which extend all along the Finnish coast.





SPEECHES DELIVERED IN THE AUSTRIAN DELEGATIONS ON MEDICAL SERVICES IN THE FIELD, 2ND AND 3RD DECEMBER, 1891.<sup>1</sup>

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December 2, 1891.

DR. BILLROTH.

GENTLEMEN OF THE DELEGATIONS,—About a month ago a healthy young man was brought to my surgery; a few hours before the lower part of his left leg had been run over by a heavy wagon. When I took off the temporary bandage, which had been skilfully put on by the officials of the Volunteer Aid Association, a round, somewhat contused wound, with a number of bone-splinters in it, was displayed in the middle of the lower part of the leg.

I said to my audience, "See, this is how a gunshot wound looks, when the projectile has struck the bone." I sent for a number of bone fractures from the Museum, which I had brought back from the 1870 war, and showed them, so that my pupils could form an idea as to what this kind of injury looks like.

I then went on to speak of the different effects on the bones of the Chassepôt bullet and Prussian elongated leaden bullet. Then I mentioned modern fire-arms and smokeless powder, and remarked that a consequence of the enormously increased penetrative power of the Mannlicher rifle-bullet will be that the projectile, after piercing a bone, will continue its course and hit several more men who happen to be in the line of the trajectory. On the other hand, the force of the old projectiles was generally expended by setting up against a hard bone, so that one could reckon with some certainty on finding the projectile in the wound when a bone was struck. I then added that it is absolutely necessary, in view of the, in all probability, greatly increased number of wounded in a future war, to increase the number of bearers and sanitary troops, since the establishment of these units is altogether insufficient as at present fixed by us.

I noticed that these remarks made a decided impression on my audience, for one's eyes get sharp after seventy-two terms of academic teaching; but I had no idea that my remarks would have the far-reaching effects which ensued. The next morning there was a report of my clinical lecture in the local papers, as is often the case. But a few days later this report appeared in many foreign papers,

<sup>1</sup> Communicated through the Director-General, Army Medical Department.—Ed.

and cuttings were sent me from newspapers, political as well as medical, from France, England, Italy, and Russia, all of which printed this report, with a request to forward the text of the lecture, which was assumed to have been delivered by me and to be already in print. But I had delivered no special lecture on the subject, but only a few incidental remarks on clinical surgery, nor had I the intention of writing upon the subject, especially as all that I knew about the effects of Mannlicher projectiles had been told me by others. I am still receiving these communications from foreign papers, and as I fortuitously made use of the expression "the projectile of the Mannlicher rifle," it now seems that this rifle is causing a terrible scare before it has ever been used in war.

I am not so foolish as to believe that my individuality is of any weight in this business. But there are certain thoughts and impressions which lie half-formed in the brain of nations, and which only need a partly accidental impulse to make them flash forth; swift, clear, and strong. And the thought in this case is this: "*Are steps taken to better the means of aid to the wounded in proportion to the increasing development of destructive agents.*"

There is good reason for the forcible expression of this thought in these days, when the Army consists of our sons and brothers, our kith and kin.

Before going into this question, we should seek to establish *why* an opinion has gained ground, that destruction will be so greatly increased by the use of these new projectiles and smokeless powder. There is not the smallest doubt that this is counted upon in military circles, for otherwise these matters would not have been submitted to us, nor, indeed, introduced at all.

As to military-surgical experiences of former wars, these have taught us to fear artillery less than soldiers themselves. For we find that the number of men wounded by artillery fire is remarkably small.

I embraced the opportunity of seeing the wounded after the battles of Weissenburg and Wörth, where a large force of artillery and also of mitrailleuses was employed. I also visited all the other hospitals later on, and frequently discussed the subject with my colleagues, and everywhere it was remarked how few were the wounds caused by artillery fire, and that there were none worth mentioning caused by cavalry weapons; cuts and stabs are the greatest rarity in field hospitals. To express it in percentages: about 80 per cent. of wounds are caused by rifle fire, 15 per cent. by artillery fire, 5 per cent. by cuts and stabs. It was formerly said that the effect of round shot and of shell was such that men injured by them died on the spot.

In 1870 the wounds of all the men were registered, whose bodies were thrown into the common graves immediately after the battles, and no new proportions were arrived at.

Hence the attention of military surgeons is directed by these facts principally to small-arm projectiles. What changes will be caused by the new projectiles and smokeless powder? Nobody can say from experience; one can only forecast. One forecast which we hear is, that

things will not be so bad, that people will shoot at such long ranges that they will hit little or nothing; that the tendency will be to attempt to manœuvre the enemy out of his position. This was just Moltke's aim in 1870, but it could not be done without great battles. In fact, troops are not obliged to change position. Moreover, to manœuvre the enemy out of his position, certain favourable conditions of terrain are necessary, and an at least local superiority. The Germans in 1870 ran up against four great fortresses; and even if this had been possible without battles, and if the French had had enough troops to attack from outside, the everlasting manœuvring must have come to an end; it must come to hard blows sooner or later.

As to the struggle between great masses of troops, that is the phase of warfare in which discipline and military culture exercise the greatest effect, and here, perhaps, personal courage is comparatively a very subordinate factor. But just in such cases, where several battalions stand one behind the other, the number of wounds inflicted will be far greater owing to the greater precision and range of the newest projectiles, unless especially favourable conditions of ground afford effective cover to the whole body of troops exposed, even whilst retreating.

Hence, when masses are struggling, the number of severely wounded men, and especially the number of injuries to bones, will be far greater owing to the above-mentioned increased power of penetration.

But, gentlemen, we need by no means assume and found our argument upon the severity of injuries; that means difficulty of treatment later on. It is the universal custom of war that every man who is slightly wounded, but bleeds freely, goes back to the dressing station. Not the number of severely wounded men, but the absolute number of men who are hit, determines the loss in men to the General, and we can predict that the latter number will, in all probability, be greatly increased by the new weapons, to say nothing of severely wounded men.

The soldier looks upon the incidents of the great mass struggles as a duel. He hardly sees his opponent at all; he does not shoot at single opponents, but only at the mass; to a certain degree he shoots only at the enemy collectively. When he has got his knock he goes off to the dressing station. He cannot judge on the spot whether his wound is slight or severe.

You will grant that in 1870 two *brave* armies were opposed to one another, and yet this conduct of slightly wounded men is the custom of war everywhere, and the men cannot, at bottom, be blamed.

As to rapidity of fire, this is, upon the whole, not very greatly increased with the new projectiles. Still, it is virtually increased by the fact that you can see much better and longer where the enemy is. Formerly both sides were wrapped in an immense cloud of smoke after firing a dozen shots, and then they went on firing at each other's smoke. Now they can nearly always see one another distinctly, and can therefore keep up a more accurate rapid-fire, and for a longer space of time.

Now as to the greater length of trajectory of the new projectiles, you may say :—What does that matter—put the dressing stations a few hundred paces further back. If they were, say, 500 paces to the rear before, then they will be 700 or 800 paces to the rear now. Quite so. But for the bearers, who have to carry a heavy man weighing 18 or 19 stone with his kit, upon a stretcher, this increased distance means not only an immense increase of labour, but also makes the journeys much longer in point of time; consequently far fewer wounded can be transported from the battle-field to the dressing station in a given time. Just try this carrying for 500 paces or even 700—800 paces! (Hear, hear.) It is no joke, and for any length of time absolutely impossible. (Hear, hear.) Now you cannot set up a dressing station, at the regulation distance from the corresponding army corps, &c., in the glare of the sun or in the rain. You must have some sort of cover for it, a house, a ditch, a patch of wood. Not that the surgeons are wanting in devotion in the enemy's presence, but what is to become of the wounded if the surgeons get shot? You may say that they are protected from this by the Geneva Convention. Yes, but what use is the Geneva Convention if your own side retreats towards the dressing station, or the enemy advances, and you find your dressing station in the firing line? This means shifting, hunting up a new place, and the wounded must set to work and find this new place. No one can form a true idea of these difficulties who has not been through them himself.

The increased number of wounded, therefore, must therefore entail a great increase in the number of bearers, which in our Service is at present very small and insufficient. Yes, we must even come to the conclusion that, in future, it will no longer be possible to remove the wounded from the field by means of bearers, unless it is to go on for days together. Hence it will be necessary to place a great number of light carriages, even close behind the line of battle, for the purpose not only of transporting the wounded to the field hospitals, but also to get them away from the battle-field itself, provided that the terrain admits of it.

Before closing these remarks on battles in the field, I cannot help remembering a psychological factor which I merely touched upon before, namely, that the soldier looks upon such a battle as a great political duel, after which there comes a kind of reconciliation, as after duels in private life.

Although in the numerous well-organized hospitals at Mannheim we could manage to separate the French Officers from the German, this was not always practicable with the men. I never observed that this led to any unpleasant feeling amongst the wounded; even the Turks were quite good-tempered among the Germans. But on one occasion this good temper was rather overdone in my opinion, and left a bad impression on me.

When I arrived at Neustadt, in the Palatinate, on the morning of August 6, 1870, by troop-train, the first train full of French prisoners from Weissenburg was standing in the station. There was a hideous noise going on; German soldiers were singing the "Wacht am

Rhein," there was a train with 100 bellowing cattle on board; the French prisoners had been given so much wine by the good Palatinate people that they were tolerably cheery, and were singing the "Marseillaise." When our troop-train moved on, the French waved to us, with "Bonne chance, messieurs! bonne chance!" (Laughter.)

Smokeless powder will also have marked influence on another form of battle, viz., on the storming of strong localities. Here manœuvring must stop. Every army occupies a certain number of these points and leans upon them in battle, and the possession of them ensures the security of the position. The storming of such places can only be effected by the greatest personal devotion of the soldier.

Here personal courage is the paramount factor, and especially the courage of the Officers. They go in front, and carry their men away with them; by persuasion they will seldom get men to rush into probable and sudden death, be the men otherwise ever so well disciplined.

At the action of Weissenburg, the first of the great Franco-German War, both sides were conscious of the immense moral effect which the victory would exercise upon the further course of the war. The storming of the walls, penetrating at the gates where the bridges were drawn up, the street-fighting, the storming of the strong Château of Geissberg, all this required heroism. In storming the latter point the Colonel fell first, then the Captain, then the First Lieutenant, and only the Fähnrich succeeds in getting into the yard of the château alive. And the French fought like lions also.

I still remember a poor young Second Lieutenant, a native of Paris; he had been shot in fourteen places, and still he stood there with the colour and his sword, till his thigh was shattered and he fell. The same kind of thing happened on the German side.

In these kinds of attacks, the result of using smokeless powder will be that artillery may be more easily disabled than formerly, for the guns in action will cause but little smoke, and the detachments will be more easily and longer visible, and will therefore be in far greater peril.

A third form of combat, and the most frightful of all, is when the outposts deliberately watch for the opportunity of shooting down an opponent, standing sentry. This is *man-hunting*. It is terrible how brutalized the soldier becomes by it. The blood used to freeze in my veins when I heard men, otherwise gentle-minded, talking thus. "I saw red-breeches walking up and down there behind the bushes; first I saw his head, then his knapsack, then his legs; at last I got a fair shot at him, I loosed off, and, you should have seen! he rolled over and over like a shot rabbit!" But if he misses, and is not hidden by smoke, under cover of which he can change his position and even hide himself, red-breeches is sure to shoot back, and the man-hunter rolls over dead.

Thus I am convinced that in every form of fighting the increased penetrative power and greater range of modern projectiles, and the use of smokeless (or nearly so) powder, will in future not only cause an increase in the number of wounded, but also in the number of severely wounded men.

Gentlemen of the Delegations, I will now tell you how all War Ministers are wont to answer these views.

First they say: "Great battles are like phenomena of nature, it is impossible to provide for everything that they may bring forth." This I can hardly admit. It is a natural phenomenon impossible of prevision when 5,000 people disappear from the face of the earth, as lately happened in unhappy Japan, in consequence of an earthquake. But we now possess so many good statistical works upon recent wars, that we can very well work out a calculation of probability as to dead and wounded.

Passing over earlier and less accurate works, we have the four-volume work on the American Civil War, and, before all, the classical work of the German General Staff on the war of 1870-71. We can gather very important deductions for the future from the data of the various battles, which give us exactly how many combatants were opposed to one another, the number of dead and wounded, even the names of the non-commissioned officers who fell.

When so-and-so army corps or regiments fight, there are so-and-so many wounded men, at least according to the present style of fighting, or rather, the late style of fighting. Whether or not these proportions will now be changed is an entirely new question.

We will consider solely the proportions as they were in 1870. Merely to indicate how such calculations may be arrived at, I take, as an example, the data of the battle of Gravelotte-St. Privat. Here we find one of the most extensive battle fronts that ever was seen. The battle began at 12 noon, and was over at 8 P.M. The Germans had 5,000 killed and 15,000 wounded. From my 1870 experiences, I reckon two-thirds of the wounded as slightly wounded, only one-third as severely wounded, which must be carried from the battle-field to the dressing station. Many of the slightly wounded men with grazes, gunshot flesh-wounds, in the extremities, &c., could, after bandaging, be quickly shipped off by hospital (railway) trains. There remain, therefore, 5,000 severely wounded.

If we assume as the greatest performance possible, that in eight hours a stretcher with two bearers does the journey from the battle-field to the dressing station ten times—an already highly improbable assumption—we find that 500 stretchers with 1,000 bearers would have been requisite; but, as the Germans were victorious, they had to take over the French wounded also; the number of French wounded was less, certainly, for the ground favoured them, and they had a better position, moreover, the Germans were the attacking side, whilst the French could retire from their hills into Metz,—altogether 10,000 severely wounded would have had to have been transported with 2,000 bearers.

This is, as I have observed before, merely an example of the method which may be followed in making these calculations; for I have already expressed an opinion that all this carrying is in war absolutely impossible of execution. It is clear that the Aid Associations can do relatively little, especially in first line.

With us the Teutonic Order of Knights, with their ambulance



park, are alone permitted to assist in first line. The Maltese Society have organized excellent hospital trains. The Red Cross Society looks after the reserve hospitals. Well, now we are told that country vehicles may be used for transporting wounded, provided they are properly fitted up. I must tell you the following incident:—On the 8th August, 1870, I had been loading up a number of slightly wounded from Wörth—the battle was on the 6th—on the railway trains standing ready for them, and the trains had just left. I was going into the town when I met a cart, driven by an Alsatian peasant; a Turco sat on the box, the Arab always *en pose*, his burnous artistically draped; in the cart lay a Bavarian, a Frenchman, and a Prussian, all badly wounded, and in a most miserable state; round the sides were hung the arms and shakoes.

Since then, when I see a game cart in the autumn, hares hung round the sides, deer, wild boar, and roebuck inside, my ideas are at once associated with this Weissenburg country cart carrying wounded.

The unfortunate men had lain the whole night and part of the following day on the battle-field. They were eventually found in a vineyard, and it was a piece of luck to find some sort of a conveyance to bring them along; for the Alsatian peasants had at that time not been sharpened up, they did not know what war meant. Later on no more carts were to be found, for when once the countryman knows that his horses and cart may be taken from him at any moment, he manages to hide them uncommonly well or send them away a long distance. So this expedient is a very poor one also.

Now, the great objection raised by all superior Officers is this, that such a large increase in the baggage will be necessary, to say nothing of the cost, that it will be no longer possible to move the army as strategy demands.

This I partly admit, but there are many other things which increase the baggage. Take, for example, the telegraph and telephone wagons. With the help of these it will be possible to fetch up the baggage quicker than formerly. Many things have been added to the trains, and there are many more to come. Why should just an increase of the train for the sake of the wounded be put out of the question? Strategy has been forced to gradually change in accordance with these conditions, and it must take these things into consideration. Surely, strategy is not to be the only science to stand still; it must move with the times, and must reckon with given means.

Many things have changed, and many more will change, but what the changes will be we cannot say. If *aéronautics* make further progress, it will come to raining down bombs lightly cased, say with aluminium, upon the combatants; or imagine electrical science so far advanced that one can dart down lightning on troops from a balloon. This is by no means absolutely impossible; these are no exaggerated fancies. Strategy will have to reckon with such things also.

I can by no means admit that it is impossible to make changes in this direction too. The thought which now inspires the mind of people universally, and has become so well-defined that it must be



reckoned with, is that help to the wounded must keep pace with the increased power and great development of ballistics.

There are still two points which I should like to touch upon. First, the illumination of the battle-field at dusk and at night by means of the electric light. I regret that up till now we are still without the necessary apparatus. The idea of lighting up the battle-field in sections by great reflectors to facilitate search for the wounded has been spread far abroad from Vienna, thanks to Baron Mundy's untiring energy. He has spoken on the subject in London, Geneva, and latterly in Frankfurt, has demonstrated the idea, and France, England, and Germany all possess these apparatus; we alone are without them. I wish, therefore, that the higher military authorities would turn their attention to the subject.

Finally, I should like to mention a point which my hon. colleague, Dr. Heilsberg, has already touched upon in committee on the Budget, viz., the question of re-establishing a military medical academy. All other European Powers have such academies, and, as we copy everything else, why should we not copy them in this matter, which is of such great importance? It was formerly stated that the Joseph Academy had to be abolished on financial grounds. *That was a great material mistake, a very great mistake.*

The makeshifts adopted in place of it have proved too insufficient. Sums have been set apart to enable medical students to study under the condition that they became military surgeons.

Further, two army surgeons annually are sent to attend our bedside lectures, so that we may initiate them in the new methods during the year, and this we, of course, do with the greatest willingness. But these are measures which can in no way replace education at a military medical school.

There is a totally different factor which must be considered in this case, and that is, military *esprit de corps*, which must be fostered in an army medical school, which naturally exists there, and which afterwards is much more difficult of creation. This is quite natural. Without military *esprit de corps*, the army surgeon is further removed from the corps of Officers than would be the case had he been educated at a military institute. The consequence is that the doctor does not hold the position he should wish, compared to the Officer, and hence a *circulus vitiosus* in which one and the other move.

Hence there can be no doubt that the establishment of an army medical academy is also of the greatest importance to us.

I have already made proposals on this subject; I have published various articles about it, and have shown that the question of expense is not so very great, for in my opinion it is now by no means necessary to establish a complete medical faculty. I have proposed that professors' chairs should be established in practical subjects and in pathological anatomy only, and that students should not be admitted until they have passed the first examination in anatomy, physiology, &c. This will be all the easier now, since a similar regulation is going to be issued with the revised orders for examination for the

Civil Service. Medical students will not be admitted to bedside lectures until they have passed the first qualifying examination in anatomy and physiology, for it has been found that many did not attend lectures under pretence of preparing for the examination, and therefore missed the all-important part of the subject, viz., practical instruction.

This foundation of an army medical school is, in my opinion, quite feasible, and does not entail great expense. But other conditions are indispensable if such an institution is to be really of use; and the most important condition is, that special material for study should be provided. It is quite useless to set students to work upon the usual clinical material. And of what does the latter consist? It is always the same, caries, tuberculosis, cancer, and other new subjects. There are comparatively few bodily injuries. Now, in my opinion, special measures should be taken in such army medical schools to ensure a supply of the material that the army surgeon needs, and that is bodily injuries.

I grant that gun-shot wounds cannot be produced, but something can be done; e.g., a horse may be hung horizontally, and then shot at twenty times or so; then students may be shown how projectiles act upon the bones, the course the bullet takes, and so on.

But the fundamental part of the subject is the study of the further course of injuries, and lesions do not differ among themselves to such an extent as not to afford some points of comparison with gun-shot wounds. The material in bodily hurts is therefore the most important desideratum for this kind of institution.

An inquiry upon this subject was opened by his Excellency Count Bylandt, late Minister of War. Everything seemed to be going on swimmingly, but you are aware that the thing failed owing to the opposition of the Hungarians—

PRESIDENT (interrupting): I take the liberty of reminding the hon. member that it is past 2 o'clock, and that his Excellency the War Minister is expected in the Hungarian Delegations, &c.

DR. BILLROTH: I apologize, I did not notice the time—(continuing)—I have nearly finished, and would only remark that in my opinion, confirmed by events, the abolition of the Joseph Academy was not only a great material mistake, but also a *great political mistake*. I am convinced that ways and means may and must be found to correct this error, and I hope that his Excellency the Minister of War will in future direct his efforts to the substantial correction of it. In conclusion I can only say, "Ceterum censeo, Josephinum esse reconstruendum." (Cheers.)

December 3, 1891.

F. Z. M. FREIHERR V. BAUER (Minister of War).

I was called away yesterday, and was therefore unable to fulfil my obligations. I now do this by conveying my warmest thanks in the

name of the War Ministry to the hon. member, Dr. Billroth, for the humane and exhaustive representation of the somewhat gloomy pictures which he has afforded us. All these pictures are expressive of a wish to alleviate the horrors which we must expect in war.

These horrors are inevitable, they are the terrible side of war, but it is the congenial and real duty of every humane man, and especially of a war administration, to alleviate these horrors.

If I may be allowed to select from the exhaustive speech of the hon. member those points which concern the war administration, and which are to create an impulse for future progress, these points would be four in number, as follows :—

1. A desire for an increase of the bearer-personnel as the means of transporting the wounded from the fighting or firing line to the place of aid.

2. An increased establishment of vehicles, in order to secure communication with establishments in rear.

3. The introduction of mobile illuminating apparatus, to provide for the lighting up of the battle-field at night.

4. Establishment of the Joseph Academy.

As to the first point, I do not altogether believe that a material increase of bearers will afford us the desired remedy. It must be laid down as a postulate of aid to the wounded, that a wounded man must be properly attended to within twenty-four hours. This is what must be aimed at and kept in view, irrespective of the self-help which a man is capable of if slightly wounded, by making use of the small packet of bandaging material which he carries with him.

The thing to be done is, then, to get a man back from the fighting or firing line to the place of aid; this is the first of the places where the regimental surgeons are assembled to afford assistance. Conditions of ground must here alone decide what the bearers can do in the way of carrying to and fro with the stretcher they have at their disposal.

Now if we increase the number of bearers and expect them to go backwards and forwards in this way, they will, every man of them, be shot down, unless the conditions of ground are exceptionally favourable. They are worse off than the men in the firing line; they seek cover, and if they cannot find it they make it, if the ground admits. To do this they have their Lünemann spades to entrench themselves with, in accordance with our regulations.

Men wounded in the firing line are either slightly wounded, so as to be able to go back without assistance, or so wounded that they must be led back to the place of aid, or, finally, severely wounded, in which case they must be carried back on stretchers.

As to the first two classes, I have learnt by experience that, unless absolutely incapacitated from further duty, they preferably avoid the way to the dressing station, for this way is far more dangerous to them than remaining near the fighting line. However that may be,

we have, until now, organized a bearer-patrol of three men per company, *i.e.* per sub-division. These are the men who carry the stretchers; they are instructed during peace time in first aid, and are provided with the means of affording the wounded man a temporary relief. All these arrangements are thought out and considered in every light. The question is, whether a *material* increase of these bearers will answer the purpose.

In any case, I reserve to myself the task of having the subject thoroughly inquired into. I accept with great pleasure the suggestions of the hon. member, who is able to speak as an authority on the subject. But, on the other hand, our military measures must be kept within certain maximum limits, and this applies to a material raising of the bearer establishment.

I should like to add that the best time for getting the wounded away from the firing line is when position is changed, either in advancing or retreating.

When position has been changed, when by the advance such a distance from the troops in front has been gained as to at least lessen the danger, then is the time for the bearer-patrols (four per battalion) to begin their work and search a space dependent upon conditions of ground, say about 800 paces per battalion.

The practical training of the bearers in these duties may be seen going on every summer at the greater manœuvres. Every effort is made to make their task clear to them in peace time. In winter they are trained as far as possible in practical medical duties on a small scale.

I hope and wish that these means will suffice, and would add that the distance (to the rear) of places of aid and dressing stations, as given in figures, is by no means to be adhered to under all circumstances. A place of aid is properly situated when under cover and as near as possible to the firing line. All regulations on this subject are kept as simple as possible.

This also holds good with reference to the distance of the places of aid from the troops in action. The distance is by no means the ruling factor, any more than the distance given to be observed by the reserves from the fighting line.

As to the second point, *viz.*, the increase of vehicles and establishment of communication with the rear, precise and binding instructions are laid down in our Regulations for Medical Services. These instructions are, that when an action commences, all available vehicles of whatever kind, empty regimental provision and meat wagons, empty supply-column wagons, vehicles otherwise requisitioned, ambulances of medical establishments in rear, &c., are to be brought up for transport of wounded, in order to satisfy requirements as far as possible. This order is categorically laid down in our service, and I think I have shown that everything that can be done in this direction, will be done.

The third point refers to the illuminating apparatus for lighting a space where fighting has been going on and where dead and wounded are still lying, or, in other words, the battlefield. This is a humane

measure which no one views with disfavour, and many experiments have been made in this direction. I was present at Baron Mundy's practical experiment. On that occasion a brilliant, staring illumination was obtained of points where the light fell, but, at the same time, I observed that the deeper shadows cast by swells of ground were so black, that the men were not discovered, and recourse had to be taken to lanterns or torches. And all this happened in a place, in the like of which we shall not fight, viz., in the Trabrenunplatz in the Prater.

At that time, so far as I remember, I proposed that a sham-fight should be held on the Galizyn Berg, so that conditions of ground might have their proper effect; but I believe this was not done.

Further, the introduction of illumination wagons would entail an increase of baggage.

Now, an increase of baggage is of itself a very objectionable factor. The baggage gives us a vast amount of trouble, and if you remember the difficulty of getting the baggage columns along, you will see that one must literally reckon with every single wagon. This circumstance would not of itself prevent us from considering the feasibility of introducing such wagons, but the question must first be decided whether these wagons could in all cases, and especially at the right time, be brought up to the place where they are wanted. We need further experience on this point. Foreign Governments, so far as I know, have also only got to the experimental stage, and this service has nowhere been introduced as a definite measure. Experiments and trials have been made with wagons, and I will do the same. As soon as we attempt to introduce this kind of apparatus, the question of building a suitable carriage at once comes to the front, and it is a very difficult one.

There is no want of lighting apparatus. The problem is to fix the heavy apparatus on a wagon which admits of easy transport, and can be brought up on any kind of ground. We have among our transport material a certain kind of heavy wagon which we still use, but is not sufficiently mobile, so we must think of some lighter conveyance.

I reserve the privilege of informing the House further on this matter when I have studied it and gained further experience in the matter, and when foreign experiences are at my disposal; for we profit by everything and everywhere we possibly can.

Finally, the question of the Joseph Academy has been touched upon. Everyone knows how the matter stands. I feel greatly flattered by the honour which has been done me in assuming that I shall bring it to a satisfactory solution, but whether I shall succeed in doing so is another matter.

I think I have now expressed the views which I entertain with reference to the very admirable speech delivered by the hon. member Dr. Billroth, and can only repeat, on behalf of the War Administration, the expression of hearty thanks for his solicitude, which is solely directed towards alleviating all the horrors which we must expect under all circumstances in time of war. (Loud cheers.)

December 3, 1891.

COUNT FALKENHAYN, Chairman of Financial Committee on Army Estimates.

Gentlemen,—I hope you will allow me a few words in order to express my views on the subject of the debate on Clause 18, certainly one of the most important and interesting which has taken place in discussing the War Estimates. We have deduced two precepts from the so comprehensive and interesting speech delivered by the renowned—I may say, not merely surgeon, but also—War Surgeon Billroth. The first precept which I have laid to heart in my present capacity, and yet as an outsider in this subject, is the intimation that, in a future war, the means of aid to the wounded provided and ensured by the State will in no case suffice. Gentlemen, they have never sufficed in past wars, for it lies in the nature of things, and these means will not suffice in future wars, even if the War Ministry, as his Excellency the War Minister has promised, takes pains to add to them and strengthen them. But the lesson I have deduced on this point, but lightly touched upon by the hon. member, is the importance of encouraging those societies which prepare in peace to afford voluntary aid in time of war; I mean those organizations which have been formed in all countries under the sign of the Red Cross.

Gentlemen, it is natural that in a long period of peace the attempts at organizing such means of aid should gradually grow weaker and weaker, for the terrible picture, as painted by the experienced hand of a man who knows war, for our benefit, is not before the eyes of the world in time of peace.

May the picture, painted for us yesterday in gloomy but faithful colours, contribute towards procuring these organizations that support and encouragement on the part of the nation so essential for its own sake, since sons and brothers are concerned.

The second point has to do with a subject which, in latter years, has not only been mentioned, but also discussed, in every Committee of the Delegations, as also in the present one. The general opinion is that the abolition of the Joseph Academy was a mistake, and that there is pressing need of the re-establishment of an army medical school, especially for surgical purposes.

His Excellency the War Minister, in his to-day's speech, only gently hinted at the reasons which, until now, have prevented the re-establishment of this academy, represented as a necessity from a military point of view also. Political, State reasons are said to form the obstacle.

Gentlemen, can it be, shall it be, that such reasons shall decide, when it is the interest not only of the common Army, but also of the whole population of the Empire, that our men should, in time of war, be rescued and cared for by those who would be trained in these duties at such an institution? I hope that this question may shortly be answered in a favourable sense by the Delegations.





## NOTICES OF BOOKS.

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*Illustrations of Field Exercises by the Three Arms, of Exercises in Minor Tactics, and War Games.* With Maps. By Brigadier-General H. M. BENGOUGH, C.B., Commanding Bangalore Division. London: Gale and Polden. Pp. 86. Size 9½" x 6½" x ¾". Price 5s., post free.

These are illustrations taken from exercises carried out under General Bengough's superintendence, at Bangalore, and both interesting and instructive is their perusal. As in them are included two rear-guard actions, it may be as well to take advantage of the opportunity to point out that, under ordinary circumstances, minor operations of this class at field exercises are often worthless, owing to the fact that where both sides are composed of troops at the same station it is very difficult to prevent the attacking force knowing the exact strength of the rear-guard to be attacked. The object of a rear-guard is to delay, and the most potent aid for this is deception of strength. But when the pursuer who knows his adversary's strength finds the rear-guard on an extensive front, he knows this is mere "bunkum;" if he finds himself strongly opposed, he similarly knows that the flanks are within easy reach for a turning movement. General Bengough introduces a somewhat novel application of kriegs-spiel by selecting for an exercise (not a game, General Bengough) a portion of the Aldershot map which offers a somewhat similar topographical situation to that of some battle which has actually been fought; and by afterwards comparing the kriegs-spiel operations with the actual operations. As we read the lecture and discussion on the exercise illustrative of Ziethen's defence of the line of the Sambre in 1815, we cannot help feeling how deeply grateful to Providence ought all military critics, historians, and instructors to be for causing the Waterloo campaign. Whom would they have had to belabour if that campaign had not been fought? Still both Commanders were men of some ability and power, and doubtless they rest peaceably in their graves in spite of the seventy-five years of wordy castigation which has been inflicted on them. One comfort our poor ignorant soldiers in England who are being everlastingly told that "India is the place for real soldiering" will derive from reading General Bengough's Illustrations—our brethren in India do, at manœuvres, just as unwise and silly things as we do in this country.—L. A. H.

*Handbook of Artillery Matériel.* By F. C. MORGAN, Major R.A. With Plates and Index. Fifth edition. London: Clowes and Sons, 1892. Pp. 138. Size 7½" x 5" x ¾". Weight under 10 ozs. Price 5s. 6d.

Major Morgan is an "Armament Major;" he has been Instructor in Gunnery at the School of Gunnery, and Inspector of Warlike Stores. His work is used as a textbook for Officers qualifying for promotion in subject "Artillery," and also by the gentlemen cadets of the Royal Military Academy. With these credentials and the book having been recast and brought up to date, it would be difficult to add to the recommendations for acceptance it already possesses.

*Field Fortification, with Examples and Answers.* By H. TURNER, late Royal Artillery. London: Swan Sonnenschein, 1892. Pp. 210. Size 7" x 5" x 1". Weight under 1 lb. Price 6s.

The title chosen for this work is hardly correct and is a little misleading. The book should rather be called "Questions and Answers on Field Fortification."

*Montrose*. By MOWBRAY MORRIS. London: Macmillan. 1891. "English Men of Action." Pp. 229. Size  $7\frac{1}{4}" \times 5\frac{1}{4}" \times \frac{3}{4}"$ . Wt. under 1 lb. Price 2s. 6d.

How easy is now attainable a knowledge of our national history of past times. Whilst times give birth to leaders, leaders influence the times in which they live. In this valuable series both sides of the subject are well illustrated. Very clear is this admirable account of the great Montrose, and in the final chapters are touches of pathos that remind us how akin we become in sorrow, even to the greatest men of the past. Mr. Morris has given us no dry history, but a living portrait.

*Trafalgar: An Historical Novel*. By D. PÉREZ GALDÓS. 7th edition. Madrid: 1888. Price 1s. 7d.

Historical novels which deal with stirring national episodes, treated fairly and truthfully, with a due regard to care as to historical details, form a very wholesome class of literature, infinitely preferable to the mawkish sentimental novel which is so much in favour in the present day.

Señor Galdós, the eminent Spanish writer, is noted as a prolific and justly popular author of this class of book, of which the one which I propose briefly to notice now is a worthy type. "*Trafalgar*" was written by him as early as 1873, and has been published both as an elaborate illustrated work costing some 12s. to 14s., and in a cheap paper-bound form, as above.

In order to put his description of this famous battle into a popular form, the author writes it in the first person, the hero being supposed to have been an eyewitness of the action, and together with what appears to be an impartial description of this great disaster in Spanish and French history he interweaves an amusing and harmless fiction.

Space will only permit of the briefest sketch of the story.

Our hero, born at Cadiz, escapes from the tyranny of an uncle and takes service with a distinguished retired naval Captain, who, in 1805, is seventy years of age. This Officer, having heard in that year from his friend, Admiral Churruca, that the Spanish Fleet is about to put to sea against the English, is fired by enthusiasm, and, incited by a patriotic old Spanish sailor, called Marcial (who has lost a leg in the service of his country), eventually decides on joining the Fleet, and our hero, his uncle, and Marcial, after various vicissitudes, elude the vigilance of the female relatives of Don Alonso (the master), and succeed in getting on board of the "*Santissima Trinidad*" (a four-decker with 140 guns), the largest ship in the Spanish Fleet.

Admiral Churruca, who is described as a slight, delicate-looking man of forty-five, with a heart as large as his intellect, commands the "*San Juan Nepomuceno*." The Spaniards are allied with the French, who are commanded by Villeneuve, and this Admiral, contrary to the wishes of his Spanish colleagues, decides to go out against the English, being impelled by the orders of Bonaparte and believing that with the twenty-four French and fifteen Spanish ships under his command they ought to prevail. Churruca wishes to remain in the Bay of Cadiz and force the English to blockade the port, as he recognizes the superiority of his enemy. Villeneuve prevails, however, and, on the 19th October, 1805, we find all three of our heroes embarked and the fleet moving out of Cadiz Bay.

Marcial, who knows all the principal vessels, informs the others that Admiral Gravina commands the "*Príncipe de Asturias*," Villeneuve the "*Bucentaur*," and Alava the "*Santa Ana*." Villeneuve's plan was to divide the squadron into four divisions: the vanguard, under Alava (seven ships); the centre (seven), under himself; the rearguard (seven), under Dumanoir; and the reserve, of twelve, under Gravina.

On the night of October 20th the enemy's lights are seen, and next day thirty-three ships are counted, formed in two columns.

A general action was now imminent.

The Allied Fleet formed a long line, and Nelson seemed bent on trying to pierce the line between the centre and rearguard.

The "*Bucentaur*" now signalled to "wear together" (*virar en redondo*), a difficult manœuvre and badly done.

It was noon (Oct. 21st). The English advanced to attack in two divisions, one led by the "Victory" (Nelson) against the "Trinidad," the other by the "Royal Sovereign" (Collingwood). The following table shows the positions of the Allied Fleet and the direction of the English attack (S. = Spanish; F. = French) :—

	<div> <div> "Neptuno" (S.) .....</div> <div>"Scipion" (F.) .....</div> <div>"Rayo" (S.) .....</div> <div>"Formidable" (F.) .....</div> <div>"Duguay-Trouin" (F.) .....</div> <div>"Mont Blanc" (F.) .....</div> <div>"Asis" (S.) .....</div> </div>
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Seeing that Nelson was about to cut in between the "Bucentaur" and "Trinidad," the Commander of the latter gave orders to bring her to, to allow the former to come up, which had dropped behind. It became evident, from the way this manœuvre was executed, that the crew were inexperienced. Many of them were levies and devoid of patriotism. The soldiers were sea-sick. The "Royal Sovereign" engaged the "Santa Ana," and the "Victory" the "Redoutable," and, being repulsed, came up to windward of the "Trinidad," who gave her a broadside of fifty guns. The "Bucentaur," which was astern of the "Trinidad," also opened fire on the "Victory" and "Téméraire," and it looked as if the "Victory," which had lost her mizen-mast and rigging, would fall to the "Trinidad." The "Téméraire," however, by a clever manœuvre, interposed and saved her consort, and, taking advantage of an opening, ranged up on the port side of the "Trinidad," and delivered a broadside on the quarter which had hitherto had an immunity. The "Victory" fell off to leeward, the "Neptune" (English) took her place, and the "Trinidad" and "Bucentaur," overwhelmed by fire and heroically resisting, were nevertheless doomed.

The sufferings on board the "Trinidad" are vividly described. The "Bucentaur"

struck her flag, and this surrender of Admiral Villeneuve had a bad effect on the rest.

The "San Augustin" and the "Héros," assisted by the "Rayo" and "Neptuno," continued the struggle. At this time a fearful explosion was heard, which for an instant drowned the sound of the 1,000 guns of the contending fleets. This was the "Achille" (French) blowing up. The "Trinidad," which was making water rapidly, was forced to strike, and an English prize crew boarded her, and by dint of great exertions kept the water under. From them it was heard that Gravina had retired with some vessels; the four French ships, viz., the "Duguay," "Mont Blanc," "Scipion," and "Formidable," were the only ones which did not come into action; Gravina retreated in the "Príncipe de Asturias," and was given chase; the "San Ildefonso," "Santa Ana," "Nepomuceno" (Churruca killed), "Bahama" (Galiano killed), and "Montañes" (Alcedo killed), were all taken as prizes.

The English prize crew on board the "Trinidad" described the heroic death of Nelson, whom the author justly eulogizes.

Next day (October 22) the English ship "Prince" tried to tow the "Trinidad," hoping to get her to Gibraltar; the English crew worked day and night at the pumps, but in vain. The water gained to such an alarming extent that a hurried rush had to be made to the boats of the "Trinidad," "Prince," and neighbouring vessels. The wounded were first seen to, but many were left on board, there being no time to help them. The sea ran high and was dotted with ships, mainly English, bent on seeking some ports of shelter. Many French and Spanish ships were observed, mostly dismantled and many in tow of English ships. One of these was the "Ildefonso." Our heroes were in a launch, and gained the "Santa Ana" (112 guns, Lieutenant-General Alava), but now mastless and rudderless and in the hands of an English prize crew. She had borne a splendid part in the battle. Supported by the "Fougeux" (F.) she engaged the "Royal Sovereign" and four other English ships. The "Royal Sovereign" was the first to be put out of action, and Collingwood transferred himself to the "Euryalus." The combat was terrible. After Alava was wounded, the Commander, Gardogui, 5 Officers, and 97 men killed and 150 wounded, the "Santa Ana" was forced to yield. The "Nepomuceno" was also captured. Our hero heard on board the "Santa Ana" details of Gravina, who fought the "Príncipe de Asturias," with the help of the "Neptune" (F.), the "San Ildefonso" and the "San Justo" against the "Defiance" and "Revenge," later reinforced by the "Dreadnought," "Thunderer," and "Polyphemus." Finding his ship absolutely disabled, Gravina signalled to retire, and, accompanied by the "San Justo," "Leandro," "Montañes," "Indomptable," "Neptune," and "Argonauta," made for Cadiz, having to abandon the "Ildefonso," which was captured.

As has been said, Churruca died on board the "San Juan Nepomuceno." He had all along been opposed to the plan of Villeneuve. On going into action he harangued his crew, after calling on the Chaplain to give them all absolution, and told them that he could now promise salvation to all who died for their country, and he would shoot anyone who failed in his duty. He knew, directly he heard the first order given by Villeneuve, viz., to "wear together," that a grave fault had been committed, which Nelson would be safe to take advantage of. The "Nepomuceno" was, as our diagram shows, at the extreme end of the line. The "Santa Ana" opened fire on the "Royal Sovereign," and gradually all the vessels were drawn into the combat. Five English ships were directed against the "Nepomuceno," but two of these passed on and Churruca had to engage the remaining three. He maintained this unequal fight heroically until 2 P.M., when the English were reinforced. The two vessels which had first come up and passed on now returned, and the "Dreadnought" closed with the "Nepomuceno." The odds were now six to one. Churruca fought with the greatest coolness, economized his fire, and paid particular attention to the laying of the guns. He seemed to bear a charmed life; but at last, after personally laying a gun with the best effect, a round shot struck him in the leg. Though fearfully wounded, and knowing that it was all over with him, he cried out, "This is nothing; keep on firing." He combated death to the utmost; at last he was forced to call for his second in command, Moyna, but was told he was dead. He then called to the Officer commanding the first battery, who, though seriously wounded, took command. Panic soon seized the worn-out crew; and

attempt was made to get under way and follow the "Principe de Asturias," which had given the signal to retire, but the "Nepomuceno" could not answer her helm. Notwithstanding the ruin and destruction aboard her, none of the six English ships would attempt to board her. Churruca, now in the last agony, ordered the flag to be nailed to the mast and that no surrender should be made while he lived, which was for a very short while longer. He never lost consciousness or complained, and tried to the last to conceal the gravity of his state. He thanked the crew for their heroism, addressed a few words to his brother-in-law, Ruiz de Apodaca, and after a message to his young wife and a prayer to Heaven, he passed away with the tranquillity of the just, and though without the satisfaction of victory, still unconquered. The "San Juan" then struck and a dispute ensued amongst the English Officers of the six ships as to who should have Churruca's sword, each claiming that the "San Juan" had struck to his particular ship. The question was therefore put to the temporary Commander of the "San Juan" to decide. His reply was "To all: for the 'San Juan' would never have surrendered to any single vessel."

The English deplored the death of Churruca, one of them saying, "Men such as he ought not to be exposed to the inevitable risks of a battle, but should be preserved to forward the science of navigation"; and every possible honour was paid to the body of the hero.

On the morning of the 24th, D. Ignacio Alava, the wounded Commander of the "Santa Ana," seeing some Spanish vessels coming towards him from Cadiz, succeeded in getting his crew to rise against their temporary masters, and in turn made them prisoners. Two English ships engaged her and the three Spanish ships which had come to her assistance, but had to draw off. The French frigate "Thémis" tried to tow the "Santa Ana," while the other three, the "Rayo," "Montañes," and "Asis," made sail to try and recapture the "San Juan" and "Bahama," but had to desist.

The "Santa Ana" was nearly got to Cadiz when a storm arose, and she and her consort which was towing her could not make the harbour. The badly wounded (including Marcial and our hero in charge) were transferred to the "Rayo," which ultimately was driven ashore. Marcial refused to leave the wreck and perished in her. This character is one of the best in the book, and is forcibly delineated, but space does not admit of noticing his amusing and caustic nautical language and souvenirs. Our hero was washed ashore, and heard from a sailor of the "Bahama," who was picked up, that that ship, after encountering severe odds, lost her Captain, Galiano.

Eventually our hero got safely to Cadiz and there heard of the fate of the rest of the squadron.

The "Trinidad" (140), "Argonauta" (92), and "San Augustin" (80) sank. The "Principe de Asturias," under Gravina, with the "Montañes" (80), "San Justo" (76), "San Leandro" (74), "San Francisco" (74), "Asis" and "Rayo" arrived at Cadiz on the 22nd, but, as we know, they returned to try and retake some of the captured vessels. The two last were lost on the coast, as were the "Monarca" (74) and "Neptuno" (80).

The "Bahama" (captured) was lost before getting to Gibraltar. The "San Ildefonso" was taken to England, and the "Nepomuceno" was, for a long time, kept at Gibraltar as a relic. The "Santa Ana" got safely to Cadiz after all.

The French lost as many ships as the Spaniards, and, with the exception of the four French ships which retired with Dumanoir without firing a shot (a lasting reproach), they fought heroically. Villeneuve, wishing to repair his error, resisted desperately to the end, but was taken prisoner to Gibraltar. Some French ships

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<sup>1</sup> Just after writing the above, by a singular coincidence, the "Times" of 26th January, 1892, had the following paragraph, which gives the subsequent history of the "Duguay-Trouin" which "ran away, and lived to fight another day," and is still doing good service at Plymouth as a training ship.

"The only line-of-battle-ship which remains on the list of the Royal Navy, out  
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got away with Gravina. Others were captured, and many perished on the coasts. The "Achille" blew up.

The story now is virtually ended. There is nothing in it to which the English can take exception. Due credit and honour is given to Nelson and his brave Captains and crews. Whether the relation of the battle is in strict conformity with the version as known to us, I leave to naval historians to judge; but I think we may all admit that a very readable and entertaining story has been made out of a national episode which, whilst one of the most glorious in English history, is justly claimed by Spain as the reverse of inglorious to the valour of the Spanish Navy.

A history of such an episode as the battle of *Trafalgar* should be ever green, and this must be my excuse for reviewing now a work which was written nearly twenty years ago, and which, I have no doubt, was well reviewed when it first appeared.

J. C. D.

*Rulers of India. Mádava Ráo Sindhia, otherwise called Madhoji.* By H. G. KEENE. Oxford: Clarendon Press, 1891. Pp. 207. Size 7 $\frac{1}{4}$ " x 5 $\frac{1}{4}$ " x  $\frac{3}{4}$ ". Weight under 1 lb. Price 2s. 6d.

An excellent history, drawn from the best authorities, of the Mahrattas and Scindia, their celebrated ruler, during the latter half of the 18th century, including a very clear explanation of the origin of the jealousy existing up to the present period between the two great divisions of the race ruled by Scindia and Holkar respectively. The volume also contains a clear description of the intrigues and complications between the Mahrattas and the British during the period under review, the result being that in 1782 the East India Company were recognized as the paramount power in the Peninsula of India. This work well repays perusal, and should be found in every regimental library now that the Army is daily becoming better instructed as to the real position we hold in relation to the great Native Powers in India.

M. G.

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of about fifty vessels of that class taken by us from the French between 1793 and 1815, now forms part of the Boys' Training School at Devonport. The establishment consists of two ships—the 'Lion,' a two-decker, which was built at Pembroke in 1847, and which gives its name to the whole, and a vessel which is officially described as 'late "Implacable."' In the year 1805 this 'Implacable' was the exceptionally fine French 74, 'Duguay-Trouin.' Under Captain Claude Touffet, she fought at Trafalgar, but escaped with M. Dumanoir's squadron. A fortnight later the squadron was met by one under Sir J. R. Strachan, and, after a gallant and bloody action, was taken. The 'Duguay-Trouin,' which lost her Captain and 150 killed and wounded, was carried into Plymouth and added to the Navy as the 'Implacable.' As she is our sole surviving French prize of the line, and as, moreover, with the single exception of the 'Victory,' she is probably the oldest battleship of any kind now belonging to us—the 'Canopus' and 'Foudroyant' having been disposed of—it has been suggested that, upon her release from her present duties, she shall be preserved at Plymouth, as the 'Victory' is at Portsmouth, as a memorial of the naval architecture of the days of our greatest maritime glories. The 'Implacable' has not, of course, had so distinguished a career as the 'Victory;' but, while in our Navy, she was concerned in the taking of the Russian 'Sewolod,' 74, in 1808; in the capture of a number of Russian gunboats off Hango Head in 1809; and in the operations on the coast of Syria in 1840, for each of which services a medal was afterwards granted."

J. C. D.

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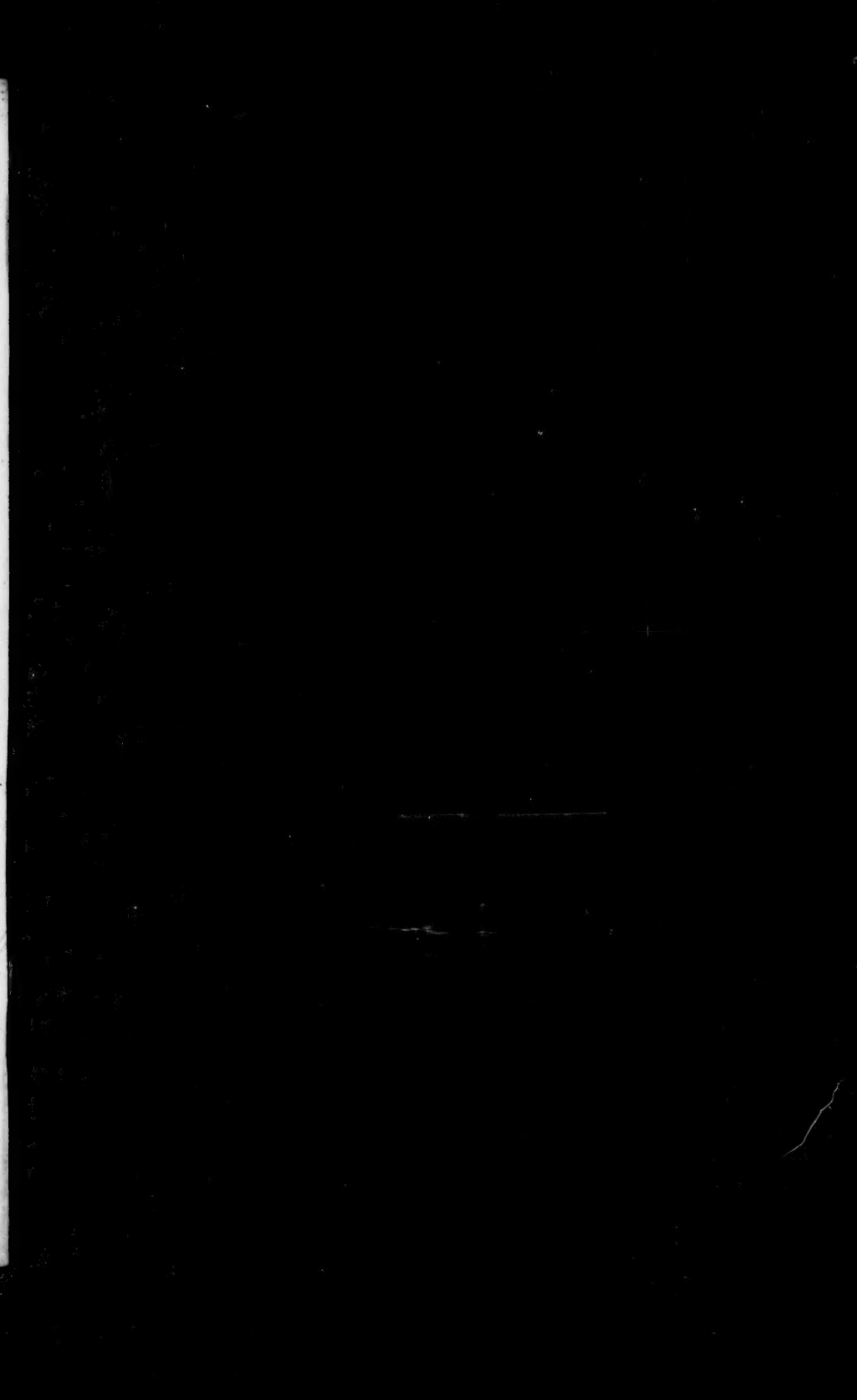
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